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THE DEVELOPMENT AND ANALYSIS OF TEACHING STRATEGIES IN AN INDIVIDUALIZED INSTRUCTIONAL PROGRAM OF PLAY SKILLS

by

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Jane Watkinson
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Date March 26/81

ABSTRACT

In the present study, mentally retarded children were taught play skills within the PREP Play Program at the University of Alberta. The skills were taught in individualized instructional sessions during which time the teachers (subjects) were observed. The observations were coded from videotapes of each training episode.

The purpose of the study was to examine firstly whether or not teachers could use feedback behaviors and secondly, if the preresponse and postresponse teaching behaviors could be implemented during individualized instruction by following specific guidelines.

The feedback behaviors developed in this study were based on preresponse prompts which were already established in the PREP Program. A complete range of teaching behaviors from complete manipulation to verbal cues was used by the teachers. These behaviors were recorded and examined to see if the teachers followed the guidelines and strategies presented to them during training.

The feedback strategies introduced in the present study were based on the attempt to establish a relationship between preresponse prompts and postresponse feedback.

It was determined that all four subjects were able to gain consistency in the use of preresponse prompts and maintain the consistency during the training in feedback. Furthermore, the teachers were able to increase feedback behaviors and reduce the amount of error in using feedback behaviors.

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CHAPTER I

INTRODUCTION

Teaching might be referred to as the interaction between the teacher and the student which results in measurable changes in the quality and quantity of skills in a student's repertoire. The structure of this interaction may vary according to the student's development, and his or her learning ability. Those children who are in early stages of development and who are developmentally handicapped, would seem to require a varied assortment of stimuli during instructional interaction. Because of developmental needs and poor information processing abilities of young mentally handicapped children, the interactions need to be well planned and sequenced to provide for skill development.

Special curricula for the handicapped (Gold, 1972; Kysela, 1978; Watkinson, 1976; Wessel, 1974) have been designed to provide the sequence through which teachers increase the skill repertoires of their students. These programs focus on task analyzing expected skill behaviors. Each target behavior is broken down into a logically sequenced set of substeps or behaviors. These steps progress from easy to difficult or simple to complex with criteria specified for each successive approximation of the target behavior. Task analysis is useful in teaching the mentally retarded because it limits the amount of information the person must process in learning to perform a certain skill. Task sequences, however, must be accompanied by specific teacher behaviors or techniques that not only facilitate acquisition of the skills, but ensure that the learner will continue to practice or use the skills after instruction is terminated.

In the past most research in education has used the curriculum as the independent variable, and student progress as the dependent variable.

A problem with this research is that by providing a curriculum to several different teachers it is doubtful that the material will be consistently presented as a single variable (Rosenshine, 1970). This is one reason then for educational research to direct its emphasis towards identifying the teacher behaviors that are used to implement the curriculum.

Essentially research must be conducted that is aimed at establishing a system of strategies to be used in conjunction with the content of the curriculum. This research must include empirical data which will be the basis for analyzing teaching behaviors. Decisions and conclusions therefore need not be based on program designers' expectations or inferences of how the curriculum might best be implemented.

Empirical data have been collected in studies which have examined the use of operant techniques in increasing the probability of occurrence and the frequency of specific behaviors. The behaviorist analyzes interactions in terms of the effects of antecedent and consequent events. In recent studies dealing with teaching, these events are referred to as preresponse and postresponse teacher behaviors (Filler and Bricker, 1976).

Research with the mentally handicapped has studied the effects of instruction that incorporates preresponse teaching behaviors, referred to as prompts or primes (Bricker, 1970; Strain, Shores, and Kerr, 1976; Watkinson, 1976; Close, Preham and Taylor, 1978; McCellan and Willis, 1979). This research has shown the importance of behaviors other than visual demonstrations and verbal instructions. Physical prompting has been included as a valuable teaching behavior to assist the child in getting the idea and feel of a movement. Other research with the mentally handicapped has used various methods of reinforcement as postresponse teaching strategies (Bateman, 1975; Levy, 1974; Rollins, McCandless, Thompson and Brassell, 1974). Reinforcement has proven to be successful in increasing the frequency of appropriate established behaviors. Such studies, including those employing task analysis, identified techniques for assisting the mentally retarded in improving their skill performance.

The PREP Program

The PREP Program at the University of Alberta in Edmonton began in 1974 in the Department of Physical Education under the direction of Dr. Pat Austin. The program involves preschool mentally retarded students who come to the university twice a week to receive play skill instruction.

> The purpose of the program was to design instructional materials for the assessment, prescription and instruction of play and movement for moderately mentally retarded children between the approximate ages of three and seven years (Watkinson, 1977; p. 4).

Since its beginning there have been forty play skills identified for instruction in the PREP curriculum. Each skill or "target skill" is composed of a task sequence or series of task steps. The number of task steps varies for each target skill. Specific criteria are included in the description of the task steps which progress from least difficult at task step one to most difficult at target skill level.

Employed in conjunction with the task sequences are various teacher preresponse prompts which have been behaviorally defined. The prompts are arranged along a prompting continuum that illustrates the order of fading teacher assistance and information. This reduction in teacher input results in the independent performance of play skills. Certain teaching strategies are presented for implementing the curriculum material and teacher behaviors in a systematic manner. Recent research (McIsaac, 1980) has empirically examined the teaching strategies in the PREP Program, specifically examining fading of teacher assistance within the prompting continuum. This study has resulted in more concern for further examination and manipulation of teacher behaviors in the PREP Program. The present study has followed this direction of research and was conducted therefore within the PREP research program.

Statement of the Problem

The purpose of the study was to define specific postresponse teaching behaviors and to develop a system for implementing these behaviors in relation to the teacher's preresponse behaviors and the child's response. By implementing these strategies it was expected that the teachers would be able to systematically fade their assistance during instruction, while bringing about increases in skill and independence in the performer. The strategies were developed and based on previous research and studies which observed the effects of teaching behaviors on learning.

The teachers were provided with information on preresponse prompting in order to establish consistent use of the prompting continuum previously designed in the PREP Program. In addition to this, teachers were given new guidelines, developed for this study, which focused on systematic use of this continuum.

The problem that was presented for the present study was to identify specific postresponse feedback teacher behaviors, and instructional strategies to employ during instruction. The goal in developing the strategies was to provide the child information about his performance which related to what the teacher had requested or prompted for in the preresponse phase of instruction.

There were three questions which had to be addressed in approaching the problems in this study. The PREP material on teacher behaviors emphasized, up to this time, the preresponse prompts by defining specific behaviors and recommending specific strategies for fading teacher assistance. Although Watkinson and Wall (1979) advocated the use of feedback to the child, they had not developed specific teacher behaviors for applying feedback. The first question then was: What are the specific postresponse information feedback behaviors used in teaching play skills to young retarded children? Further to identifying these behaviors, the second question was: What is a logical system of strategies which allows the teacher to not only use feedback, but to reduce the information feedback in relation to the reduction of teacher prompts during preresponse instruction?

The task of defining specific teacher behaviors and strategies seems only to be the first step in providing teachers with guidelines for curriculum implementation. The introduction of these behaviors and strategies would be of no value unless they are practically useful. This leads to the third question: Is it possible to train teachers to implement and maintain a complex system of preresponse and postresponse teaching strategies?

Scope of the Investigation

This study was conducted as part of an ongoing research program for the purpose of developing additional training material for teachers of mentally retarded children within the PREP Program. Specific teacher behaviors were identified for the postresponse phase of instruction. These behaviors were systematically implemented during instruction to coinside with preresponse behaviors already established in the PREP Program. These behaviors fell into one of three categories: physical, visual or verbal. The system for fading teaching behaviors was based not only on studies and projects done within the PREP Program, but also on studies done elsewhere by other researchers. The scope of this study was limited to teaching strategies to be used specifically in the PREP Program although the categories of behaviors are also commonly used in language and self-help programs (Kysela, 1978; Sulzer-Azaroff and Mayer, 1977; p. 182-200). The teaching strategies were applied to two Target Skills: Jump Down and Swing on a Bar. These specific skills were chosen because:

1) they are skills that are normally found in the play repertoires of young children;
2) they have a task sequence of at least four steps,
3) they are considered tested and valid sequences (Watkinson and Wall, 1979), and
4) they are discrete skills which allow for easier analysis of preresponse and postresponse phases of instruction.

Limitations

A major limitation of this study was that the teacher data was gathered on videotape and the teachers were always aware of when data was being collected. It could not be known, therefore, if their use of feedback strategies would be put to effective use in more natural situations.

The study employed a single subject design with four subjects. This limits the degree to which it can be assumed that all teachers could employ teaching techniques of the same or similar nature. However, since the subjects had no prior experience in the PREP Program, it could be assumed that the results would be within range of typical performance of teachers who are trained in this manner. The use of a single subject design was necessary due to the nature of individualized instruction and due to a need in educational research to examine individual teachers as opposed to groups of teachers (Flanders, 1970). This design is necessitated also by the nature of the questions to be answered within this study. The questions are aimed at individualized instruction and the specific teacher behaviors for young retarded children therefore require extensive observation of individual teachers.

Definition of Terms

teaching episode. "... in the Prep Program begins when the teacher initiates an interaction with a child through any means of communication, and ends when the child is left alone again to play" (Watkinson and Wall, 1979, p. 30).

preresponse behaviors. The behaviors of the teacher, including verbal, visual and physical behaviors used before the child responds and applied with the intention of elicting a response.

postresponse behaviors. The behaviors of the teacher, including verbal, visual or physical behaviors used after the child responds, to give information feedback or reinforcement as a direct result of the child's response.

response trial. A response trial may generally consist of a prompt, a pause long enough to provide the child time to respond (as long as 8 seconds) as well as feedback and/or reinforcement (if a response has occurred). A response trial occurs within a teaching episode and requires some teacher behavior to occur either before the response or after the response.

fading. A gradual removal of prompts used to foster an independent performance without any kind of assistance or support.

CHAPTER II

REVIEW OF LITERATURE

Teaching Competencies

While the search for competent teaching has gone on for decades, Brown and York (1974) allege that recently there is additional emphasis on efficiency in all areas of professional careers. They explain that the system analysis approach to problem solving has resulted in defining professional competencies which are required in the work field. This approach has now permeated the philosophy of educational administration so that the need to identify teacher competencies for the handicapped has also become evident. Sontag, Burke, and York (1973) have suggested that the identification of these competencies is even more crucial in teaching the severely retarded, since:

> In our view there is a direct relationship between the level of students' disability and the competencies of the teachers, i.e., the more pronounced the level of disability, the more specific and precise are the competencies required of the teachers (p. 23).

To conduct studies which aim at identifying and evaluating teacher competencies, it is necessary to establish some basic premise or definition of what is implied by the term "to teach". This definition must lead to some obvious or behavioral procedures which can be expected of a competent professional.

Teaching may be defined as arranging the environment of the child and stimulating the child to interact with it, resulting in specific changes in the quality and quantity of skills within the child's repertoire. Brown and York (1974) allege that there are three practical competencies that a qualified educator must have:

1. that the teacher is able to delineate precisely the skills the students will perform which they are not presently performing in the presence of the teacher,
2. that the teacher engage in specific behaviors and use certain techniques to enhance the quality and quantity of skill in the child's repertoire, and
3. that the teacher must verify the existence of changes in the repertoire of the students.

The teacher can often accomplish the first by using the curriculums which consist of task analyzed target behaviors. Understanding the application of task analysis is an important teaching strategy. Reasons for the importance of task sequences are discussed by Williams, Brown, and Certo (no date available). These authors state that the task sequences provide a specification of starting points and terminal objectives. An assessment of the child's performances will indicate precisely where the child is at in his or her development and precisely what his instructional needs are. If teachers employ task analyzed programs, then they can meet the third expectation of verifying changes in the child's repertoire. The advantage of task analysis for handicapped students, specifically the retarded, is that this procedure lends itself to individual instruction of different learning skill levels. This is vital since the retarded experience difficulty in processing and learning new information.

It should be recognized that task sequences do not give a statement of how to teach, but rather what should be taught (Williams et al., no date). A problem then, is that the second expectation by Brown and York has not been sufficiently addressed. Program designers often provide only general techniques to assist the teacher in presenting curriculum material. More specific strategies are required which indicate how the teacher should act and react behaviorally during instruction.

Behaviors which can effectively change or modify the behavior of others have been examined by researchers in applied behavior analysis. Sulzer-Azaroff and Mayer (1977) define applied behavior analysis programs as follows:

> Formally defined, applied behavior analysis is a systematic performance based, self-evaluative method of changing behavior. It is used in the prevention and amelioration of behavioral problems and in programs for learning (p. 6).

Numerous studies have tested methods of changing behavior with mentally retarded subjects. There has been repeated success in improving behavioral skills. The principles and methods which are examined and recommended as a result of the research, are part of an essential technology for competent teachers.

Behavior is defined by Sulzer-Azaroff and Mayer (1977) as "... any observable and measurable external or internal act of an organism" (p. 512). To study the process of behavioral change, behaviorists analyze situations in terms of antecedent behavior (before a response) and consequent behavior (after a response).

Studies in Applied Behavior Analysis

Antecedent and consequent behaviors have been examined using techniques such as priming and reinforcement to improve client behaviors (Buell, Stoddard, Harris, and Baer, 1968; Hardiman, Goetz, Reuter, and LeBlanc, 1975; Close, Irvin, Prehn, and Taylor, 1978; McClellan and Willis, 1979). Although many such studies have attempted to increase the frequency of specific behaviors, some claim that these techniques may also lead to improved quality of performance.

Buell et al. (1968) investigated the application of social reinforcement to bring about improved motor skills and social contact in a playground setting. In the initial phase of treatment both physical priming (placing the child on the equipment) and reinforcement (teacher attention) were used. The purpose of the priming was to expose the child to the equipment so that reinforcement could then be given. During the second phase of treatment, priming was removed and only reinforcement was provided. Initially there was a decline in the rate of equipment use; however, this later increased with only the application of reinforcement. The investigators suggested that the two techniques (primes and reinforcement) interacted to produce the initial results. The transitory reduction in equipment use, when priming was reduced, indicated to the researchers that a certain amount of the behavior was dependent on the teacher's prompts. Although the authors recognized the important function of primes in this study, their main conclusion dealt with the effects of reinforcement.

The conclusion of Buell et al. (1968) that reinforcement had a "... clear and powerful role ... in developing a selected response class in a preschool child" (p. 172) would seem well founded. However, it is important to note the role that priming played in providing the opportunity for reinforcement to be given. While the authors indicated that priming was useful in this role, they failed to realize how essential this technique is in teaching new behaviors. It seems reasonable that those authors should recommend that priming be viewed as a vital behavior in these interactions.

The use of primes and reinforcement was also examined by Hardiman et al. (1975) in a study where these techniques were used to increase a child's participation and skill development in six large motor activities. During free play, participation was encouraged through verbal primes which directed or encouraged the child to engage in a specific activity. To improve skill, the training sessions included limited physical assistance where it was required for safety in showing the child where to place her feet and hands. When the child initiated her own activity in free play, teacher attention was used as reinforcement.

The results indicated that the primes increased the subject's participation but not her skill level. The researchers concluded that primes and contingent attention did not lead to skill acquisition if the skill was not already in the child's repertoire. It should be noted however, that the primes implemented in this study were not specific or instructive in nature. Their main function was to request that the child engage in an activity but the request contained only minimal information about how to perform the skill.

A point made by the authors was "... that throughout the study primes were more effective than contingent attention for increasing the subject's engagement in all activities" (p. 407). To explain this, the authors pointed out that when the child did not engage in any activity, there was no behavior to reinforce. The conclusion, therefore, was that the subject controlled the application of reinforcement and not the teacher. It was only when the teacher used primes that there was increased probability that the subject would engage in an activity and thus receive reinforcement. In addition to the explanation given by Hardiman et al., it might be suggested that on those occasions when the reinforcement could be applied it may not have been appropriate or strong enough to encourage the child to engage in the activity again. It may also be hypothesized that if the child's skill level was not adequate for the equipment to be used effectively, there may have been little intrinsic motivation for the child to use it.

Consequent teaching behaviors have often been applied in previous research as reinforcement. The consequent or postresponse phase of instruction can, however, consist of both reinforcement and feedback. Although the ultimate purpose of both may be similar (i.e., to increase the frequency of a behavior), the specific function and character of each is distinct.

The effectiveness of reinforcement is evidenced best when the behavior is already within the child's repertoire. Reinforcement is given to indicate the appropriateness and acceptability of the performance. There is no specific indication of how to perform better but rather, to perform the behavior again in the same circumstances.

Feedback serves to give information regarding what the behavior was and how well it was performed. It is expected that the learner will process what the behavior was and why it was correct. This same type of information is given if the behavior was inappropriately performed. Although the feedback information may in fact act as reinforcement, the feedback must include some specific information regarding the behavior. This gives the learner something definite to process.

Some previous studies (Bellamy, Peterson, and Close, 1975; Irvin and Bellamy, 1977) have included feedback and reinforcement as part of procedures used with mentally retarded subjects. The goal was to examine whether or not the retarded could learn specific skills and how stimulus features could be manipulated to promote learning. These studies did employ postresponse behaviors to correct errors and to reinforce appropriate performances. The behaviors of the trainers included verbal corrections, modelling and physical assistance. Such studies have, however, led to an interest in observing the effects of various feedback behaviors.

Close, Irvin, and Taylor (1978) looked at the use of verbal and physical corrections to increase the efficiency of assembly-skill tasks of mentally retarded workers. They used two types of verbal correction (a general verbal cue and a specific verbal cue) and three types of systematic physical-correction procedure (gesture, physical prompt, and repeated practice). The subjects were randomly assigned to six treatment conditions. The results seemed to indicate that verbal statements can inform the severely retarded that an error was made but that this is not as effective as physical prompting or overcorrection in improving the skill performance.

Close et al. (1978) recommend further research to determine what circumstances can make these procedures predictably successful. The authors suggest that such results will lead to an understanding of the role of the trainer's behavior in teaching skills.

One study which manipulates the prompting and reinforcement behaviors of a teacher was conducted by McClellan and Willis (1979). This study examined the independent and combined effectiveness of imitative prompts and specific praise. These teaching techniques were used to increase the rate of verbalizations of a child in a special education class. The treatments were staggered over two situations and applied in three phases.

The first phase of treatment involved the teacher using a student model when the subject did not respond appropriately or did not respond at all. In the second phase the teachers used specific praise after a correct response and did not include any prompting other than teacher verbal solicitations. The specific praise used in this study might be considered as a form of feedback since the teacher specific the correct behavior ["Very good, you answered out loud so everyone could hear you" (p. 40)]. The third phase of the experiment involved the combined use of imitative prompting and specific praise. A correct response resulted in specific praise being given and an inadequate response resulted in the teacher using an imitative prompt to get a correct response. Subsequently, the child was reinforeced with specific praise.

McClellan and Willis concluded that the rate of verbal responding did increaes significantly using the techniques of imitative prompting and specific praise. The investigators claimed that the results illustrated a difference in the effectiveness of the two procedures when applied independently, as opposed to a combination of both. Based on mean percentages of verbal responses, the authors concluded that the most effective treatment procedure was a combination of both imitative prompts and specific praise. It was further emphasized that it was important to recognize the need to eventually fade the prompts and praise reward to a phase whereby these occurred more naturally in the individual's environment.

Analysis of Teaching Behaviors

The previous studies illustrate some of the principles of applied behavior analysis and how successful their application can be in bringing about behavior change. However, little research has been done which studies how different teachers apply these techniques and what effects the various applications have upon responses. This would include three phases of teaching research. The first phase would identify specific teaching behaviors while the second phase would involve observations to confirm that these occur. This phase would include an examination of whether or not there is systematic application of those behaviors. The third phase of research is to determine the effectiveness of the teaching behaviors and their application, using student progress.

Identifying Teaching Behaviors

There are a few studies which have attempted to identify teaching behaviors (Brophy, 1970; Filler, 1976; Filler and Bricker, 1976; McIsaac, 1980). Table 1 summarizes the behaviors which were recorded in the first three studies referenced above. The comparison indicates that Brophy really only observed verbal behavior of teachers. These verbal behaviors centered on the degree of specificity included in both the verbal instructions and feedback.

TABLE 1

BEHAVIORS OF TEACHERS FOR PRERESPONSE AND POSTRESPONSE IN VARIOUS STUDIES

Study	Preresponse Behaviors	Response	Postresponse Behaviors
Brophy (1970)	- Verbal - Manipulation of equipment	Not defined	- Verbal
Filler and Bricker (1976)	- Verbal - Manipulation of materials - Points - Guidance* - Demonstration*	- Correct - Incorrect	- Verbal - Physical - Rewards*
Filler (1976)	same as Filler and Bricker (1976)	- same as (1976a)	- same as (1976a)

*Behaviors which were deleted from analysis due to infrequent occurrence per session (< 1.0).

In the Filler and Bricker (1976) and Filler (1976) studies, the number of behaviors were extended. In the preresponse phase, the investigators included a limited amount of visual (pointing and demonstration) as well as physical (guidance) behaviors to be coded. During their analysis, however, the researchers deleted guidance and demonstration because the mothers in the study did not use these preresponse behaviors frequently. The postresponse behaviors such as negative verbal feedback and negative physical feedback were too infrequent to be included in data analysis.

Filler (1976) recognized that as correct responses increased, so too would the percent of positive feedback. For this reason, the postresponse data was displayed as the ratio of positive verbal feedback to correct responses, and the ratio of positive physical feedback to correct responses. Filler believed this was important because:

> Representing postresponse measures as ratios minimized the probability that an increase in the correct responding of children, if accompanied by an increase in positive feedback, would result in a failure to detect postresponse feedback differences among the groups during intervention (p. 607).

However, Filler does not attempt to relate the feedback to the preresponse behaviors. The preresponse and postresponse behaviors are examined separately in relation to the correct responses and not to any relationship between them and postresponse which may result in more correct responses. The data in Filler's (1976) study indicated that preresponse behaviors had a more dramatic effect on improvement in performance than did postresponse behaviors. This was in fact the opposite of an earlier observation study (Filler and Bricker, 1976) which indicated that postresponse behaviors seemed to influence skill performance. As a result, it might be suggested that data should be collected not only on all possible teacher preresponse and postresponse behaviors but also on whether or not a relationship exists between the two behaviors.

The appreciation of the importance of preresponse and postresponse events is vital in understanding teaching and its effectiveness. Past studies (Brophy, 1970; Filler and Bricker, 1976; Filler, 1976) have attempted to discover which phase of the teaching episode has the greatest influence in learning. The reason for conflicting results is likely due to an incomplete list of teacher behaviors and a disregard for the possibility that both preresponse and postresponse behaviors are equally essential in learning. Another factor may be that behaviors of low frequency are often deleted from the data analysis when in fact these behaviors may be very important to the teaching process.

PREP Research on Teaching Behaviors

The PREP Project is an on-going research project with the Patricia Austin Centre for Adapted Physical Activity Research and Program Development. The Program and research has been committed to developing curriculum materials and instructional methods for teaching play skills to young mentally retarded children. Special attention has focused on individualized teaching of play skills. The program materials were originally developed in 1976 (Watkinson, 1976) and have since been updated through continued research (Watkinson and Wall, 1979).

The PREP Program has previously conducted two studies which examined teaching behaviors during instructional sessions. The first study (Whincup, 1978) arose as the result of a need to develop a tool to monitor teaching procedures and child development with the PREP Program. The observational instrument was based on the motor abilities of the mentally retarded, PREP Program teaching strategies, and the theoretical constructs of applied behavior analysis and motor skill acquisition (Whincup, 1978). The researcher reported that an observational instrument in PREP could be used:

> 1. to provide suitable feedback for teachers, thus enabling them to assess and develop their own teaching skills,
> 2. as a research tool to provide data in test, treatment, retest situations (p. 47).

The categories of behaviors that were coded included antecedents, behaviors, and consequences. In Whincup's study, the antecedent and consequent behaviors were defined primarily as verbal, but they could also be paired with manipulation, physical prompt, demonstration, environmental or body focus, or environmental manipulation. The verbal behaviors were referred to as "mands" or "solicitations." The verbal "mands" referred to a specific skill (e.g., "Kick the ball") and were regarded as firm direct statements. "Soliciations" on the other hand were less direct and more informal (e.g., "Can you kick the ball?"). Verbal behaviors could also infer what response was expected from prior performances (e.g., "Let's try again.").

The consequences were coded as verbal positive or negative iwth physical pairings [e.g., a pat or a hug (positive); a poke or a shake (negative)]. Whincup also included feedback under the consequent category. She defined "augmented feedback" as any "... verbal behavior by the teacher which gives the child information about the immediately preceding skill or motor response" (p. 71). She also stated that "feedback must give some information to the child regarding why the response was good or bad ..." (p. 71). It is noted that Whincup did not define or code any teacher feedback of a physical or visual nature; she only referred to feedback as being verbal. In defining feedback and differentiating it from the antecedent behaviors, Whincup is definite and precise. She stated that feedback is prompted by the previous response and manding refers only to the next response. This is very similar to Brophy's (1970) identification of postresponse feedback behaviors:

> All of this teaching was considered as postresponse ... since it occurred after the original error and was triggered by the preceding actions of the child (p. 87).

The observation instrument developed by Whincup (1978) for the PREP Program was tested by having observers code videotapes of teaching segments. The coded data was assessed for inter-observer agreement using the formula:

$$\frac{\text{number of agreements}}{\text{number of agreements and disagreements}} \times 100.$$

Whincup's instrument yielded high inter-observer agreements (80-90%) in all the behavior categories except Motor Soliciations which had a mean of 59.52 percent agreement.

The behaviors identified by Whincup (1978) led to the development of a preresponse prompting continuum (Watkinson and Wall, 1979). This continuum consisted of a range of prompts with varying degrees of teacher assistance. This assisted the teacher in evaluating the degree of learner independence in performing specific skills. In other words, the key feature of the prompting continuum was the decrease of teacher assistance as the proficiency of the child increased. The amount of teacher assistance varied from physical manipulation to no direct teacher assistance at all.

The second investigation of teaching behaviors in the PREP Program (McIsaac, 1980) used the prompting continuum to record the effectiveness with which teachers faded their assistance. The observational instrument used in this study was somewhat different from that developed by Whincup (1978). McIsaac's instrument included four major phases of instruction (see Figure 1). The preinstruction phase assured that the learner was attentive to the teaching situation and in a prepared state prior to the execution of a specific skill. The preresponse phase included specific teacher behaviors which provided assistance and/or information to the learner for a skill response. The skill response phase was that phase in which the teacher evaluated the child's response. Finally, the postresponse phase was described as the instructor's opportunity to provide feedback relating to the preceding performance.

McIsaac attempted to examine specific teacher behaviors by collecting empirical data to describe how the teachers were in fact assisting students during instruction.

To obtain information on the contingencies which existed between teacher behaviors and learner responses, the data were treated relative to three indices:

1) Calculation of percentage of correct learner responses for attention, position and execution over episodes of instruction,

Phase of Instruction	Symbol
A) Pre-instruction	
Desired Response	
Attention	A
Position	P
Execution	E
B) Pre-response	
Physical	
Complete Manipulation	CP
Manipulative Prompt	MP
Minimal Guidance	MG
Visual	
Teacher Demonstration	D(I)
Student Demonstration	D(S)
Partial Skill Demonstration	PD
Gestural Prompting	G
Verbal	
Skill Cue	SC
Skill Mand	SM
Active Cue	AC
C) Response	
Correct Response	C
Incomplete Response	I
Incorrect Response	X
Negativism	N
D) Post-response	
Physical	
Complete Manipulation	CM
Manipulative Prompt	MP
Minimal Guidance	MG
General Feedback	GF
Visual	
Teacher Demonstration	D(T)
Student Demonstration	D(S)
Partial Skill Demonstration	PD
Gesture	G
Verbal Response	
Skill Cue	SC
Skill Mand	SM
Action Cue	AC
General Feedback	GF
Interruption	/
Pause	*

Figure 1. Observation Instrument for Coding Teaching Behavior in PREP (McIsaac, 1980)

2) Measurement of instructor assistance provided according to response prompting continuum, noting fading of assistance (a) within each episode, (b) over series of episodes, and (c) in relation to corresponding percent correct learner response.

3) Calculation of percent specific feedback, percent general feedback, percent occurrence no feedback provided over episodes.

The data collected from these indices made it possible to calculate the appropriateness of the information the teacher was providing the child in relation to his correct responses. The researcher was also able to determine if the teacher was gradually fading her assistance over time.

A weakness in McIsaac's indices of measurement was that the percent of feedback was not related to the number of correct responses. Bricker (1976) found this relationship to be a significant one. Furthermore, the nature of the study made it impossible to determine the relative effectiveness of feedback and prompting. It is recognized, however, that this was not the intent of the researcher and therefore not within the scope of the investigation.

By collecting empirical data on teacher behaviors, McIsaac was able to suggest specific reasons for lack of student progress. Further to this, McIsaac made recommendations for teaching strategies during intervention:

1) Teachers must be more conscious of systematically reducing their prompts.

2) Teachers should employ delaying techniques especially after a verbal cue to promote fading of teacher assistance.

3) Two factors which may contribute to small increases in skill performance were (a) not prompting and maintaining a child's attention, and (b) not ensuring that the child was in the

correct preresponse position.

4) Teachers should be more conscious of using general and specific feedback with the particular task step they are teaching.

5) Extensive use of reinforcement should be used because it improves instructional effectiveness.

McIsaac's study, however, emphasized the preresponse phase of instruction. The definition of feedback did not attempt to define specific teacher behaviors:

> General feedback refers to any teacher initiated information provided about the behavioral response which expresses a simple evaluation. The feedback may be physical, visual and verbal but it does not provide any specific information relative to the performance of or the outcome of the response (p. 124).

The feedback definition given applied to reinforcement rather than information feedback. There was confusion therefore as to what specific information feedback behaviors were recorded. At the time of McIsaac's study, little consideration was given to feedback behaviors as opposed to reinforcement behaviors, and their effective implementation.

CHAPTER III

PRERESPONSE AND POSTRESPONSE BEHAVIORS AND STRATEGIES

Introduction

Good, Biddle and Brophy (1975) allege that certain assumptions are needed in order to yield definitive information about effective teaching. One assumption is that the relationship between teachers' behaviors and children's responses is complex. The effectiveness of teaching behaviors may be related to student variables such as sex, age, and personality traits. A second assumption is that teaching behaviors will vary according to context and circumstances, for example whether or not a skill is new, whether the child responds correctly, incorrectly or incompletely. In spite of these assumptions is postulated that systematic strategies can be developed that would facilitate learning.

From previous research (Brophy, 1970; Filler and Bricker, 1976; Filler, 1976; Whincup, 1978; McIsaac, 1980) three instructional phases of a teaching episode can be identified: preresponse, response, and postresponse. These three phases together encompass the essential behaviors of teaching especially in an individual instructional program.

Preresponse Prompting Continuum

Individualized instruction occurs in the PREP Program (Watkinson and Wall, 1979) in brief instructional episodes in which a teacher interacts with one child. To ensure correct responses during this episode, the teacher employs the Preresponse Prompting Continuum (see Figure 2). The preresponse prompts in the PREP Program (Watkinson and Wall, 1979) are categorized as follows:

1) PHYSICAL behaviors include those in which the teacher directly contacts the child in order to manipulate or support the child's body or body parts while the child performs a skill.
2) VISUAL behaviors are any non-contact teacher behaviors which focus the child's attention on a key feature of a skill.
3) VERBAL behaviors are words or sentences the teacher uses to communicate to the child the expected skill performance and/or focus the child's attention on some aspect of the task.

To facilitate the eventual fading of physical and visual prompts, the behaviors are always paired with an appropriate verbal prompt. As the child's performance become more consistent, the teacher decreases the amount of assistance by reducing or delaying the prompts and the child is expected to become more independent in responding. This is illustrated in Figure 2.

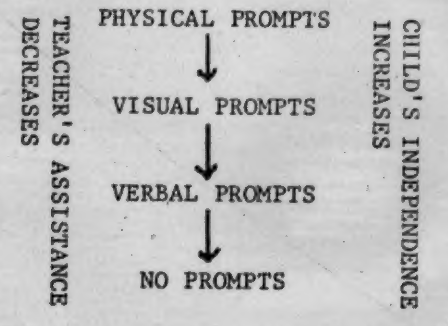
TEACHER'S ASSISTANCE DECREASES
PHYSICAL PROMPTS
VISUAL PROMPTS
VERBAL PROMPTS
NO PROMPTS
CHILD'S INDEPENDENCE INCREASES

Figure 2. Postresponse Prompting Continuum (Watkinson and Wall, 1979)

In the phase immediately after the child's performance, the post-response behaviors can also be of a physical, visual and verbal nature. They can be used in fact, to give reinforcement and information feedback to the child about his performance. Reinforcement is used to increase the frequency of a response and information feedback (physical, visual and/or verbal) assists the child in correcting a performance (see Figure 3). It is expected that he will be able to make use of feedback on his own to evaluate the quality of the response.

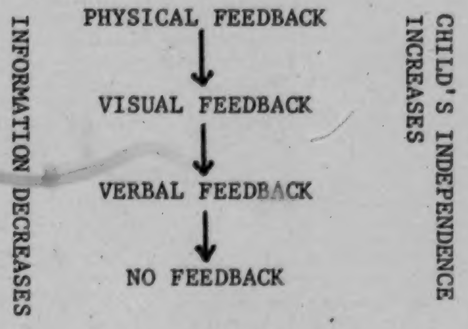

Figure 3. Postresponse Feedback Continuum (Watkinson and Wall, 1979)

Prompting Behaviors and Preresponse Guidelines

In order to reduce teacher assistance the teacher must work at moving from physical prompting to verbal prompting or even to no prompt at all. This process is called fading, and the PREP Program material (Watkinson and Wall, 1979) contains a systematic framework for this process. The framework consists of three levels of prompting behaviors within each category (see Figure 4). Through skillful fading the teacher reduces the amount of information and assistance so that she moves from a point where she uses complete manipulative prompting to a point where the child can perform the target skill in free play, without assistance

Physical Prompts
  Complete Manipulation
  Manipulative Prompting
  Minimal Guidance

Visual Prompts
  Complete Skill Demonstration
  Partial Skill Demonstration
  Gestural Prompting

Verbal Prompts
  Skill Cue
  Skill Mand
  Action Cue

No Prompts
  Initiation with Environmental Goal
  Imitative Initiation
  Initiation in Free Play

Figure 4. Fading Within the Response Prompting Continuum (Watkinson and Wall, 1980)

of any kind. The definitions for each behavior can be found in Appendix B.

McIsaac's (1980) study indicated that, although the PREP materials seem to give the teacher all the necessary tools for systematic teaching, the results definitely indicated that the teachers did not systematically fade their assistance. As a result of McIsaac's (1980) recommendations and the findings of a pilot study (Watkinson and Jordan, see note), a system of guidelines was developed for the present study. These guidelines focus on the concept that the child must be performing consistently before the teacher fades to the next prompt level or category. More specifically this concept was based on the following factors:

1. McIsaac's (1980) study revealed that teachers were not prompting effectively or systematically resulting in slow learner progress.
2. A pilot study (Watkinson and Jordan, see note) revealed that

because fading occurred too quickly, learner progress appeared inconsistent. Teachers who faded quickly form physical to visual or verbal prompting and then to a new task step often found that they had to return to physical prompting at the previous task step. To minimize incorrect responses, fading must be done gradually by moving to less instructive prompts (Sulzer-Azaroff and Mayer, 1977, p. 205).

3. In order to avoid slowing progress and/or developing extended dependence on prompts, the teacher should probe frequently. The probe will function as a test of the child's performance with less teacher assistance than is usually being given during instruction.

The preresponse guidelines are aimed at making the teacher more skilled at fading systematically and ensuring consistent child response before fading.

The guidelines for preresponse prompting were presented as follows:

1. An appropriate verbal prompt should accompany any physical or visual prompt. For example, if the teacher is touching the child's knees, the appropriate verbal prompt in Jumping Down might be, "Bend your knees."
2. A probe should be used once during each technique episode. The probe should be from two prompting categories. For example, if instruction is typically at the physical category, the probe should be at the verbal category (skill mand). If the child responds correctly, the teacher should continue at the verbal level to establish whether or not it is a typical performance.

3. When there are two consecutive incorrect responses or no responses, the teacher should return to the previous prompt level. For example, if the child responds incorrectly twice in a row with a Manipulative Prompt, then the teacher should return to a Complete Manipulative Prompt for one or two trials.
4. Teachers must obtain at least two-out-of-three correct responses before fading to the next prompt level. (This can be carried from the previous episode). For example, the child would have to respond correctly two-out-of-three trials at a Demonstration level before the teacher uses a Partial Demonstration.
5. Three consecutive correct responses should be obtained at Minimal Guidance before giving only a Demonstration.
6. If a Skill Cue has been used as a prompt, a new or different Skill Cue should be introduced only if the original error has been corrected. For example, the teacher should not tell the child to bend his kness and then to land on two feet if he has not correctly performed bending his knees.
7. The teaching episode should start at the most typical response (prompt) from the previous episode. For example, if the child was last performing consistently with Minimal Guidance and is ready to move to Demonstration, Minimal Guidance should be used for the first trial in the next teaching episode.
8. There must be at least two levels of prompts used within a category before prompts are faded to the next category. (The level of least assistance within each category

should normally be used.)

9. Independent performances at a skill mand for each task step must be attained before the teacher prompts ahead to the next task step.
10. A verbal indication must be given to the child as to whether or not the child's performance was correct or incorrect. This evaluation must conform with the task step criteria.
11. Each prompt given must be appropriate for that task step and not for a task step previously taught or for one which has not been taught yet.

The preresponse guidelines were developed not only to make teachers more conscious of their prompting, but also to give them some specific criteria on which to base their strategy decisions. The teachers in this study were told to follow these guidelines unless there was a specific fault that prevented them from using any of the guidelines.

The Rationale for Feedback Behaviors

The identification of specific feedback behaviors in the present study was based on previous research (Brophy, 1970; Filler and Bricker, 1976; Filler, 1976; McIsaac, 1980; Whincup, 1978) which included postresponse behaviors. All of these studies were able to distinguish postresponse from preresponse and as a result, were able to code teaching behaviors which did in fact occur after the learner's response. These studies established then that postresponse behaviors occurred and may in fact have influenced or have been a determinant of leanring (Filler and Bricker, 1976). Other studies have indicated that both prerespnse and postresponse behaviors function together or interact to produce increased frequency of performance as well as some increase in quality of skill performance (Buell, Stoddard, Harris, and Baer, 1968; Hardiman, Goetz, Reuter, and LeBlanc, 1975; McClellan and Willis, 1979).

The existence of preresponse and postresponse teacher behaviors is recognized and reported in the PREP materials (Watkinson and Wall, 1979). A continuum of behaviorally defined preresponse prompts has been established within the major categories of physical, visual and verbal. The purpose for establishing a postresponse feedback continuum was to assist the child in evaluating his/her skill performances, thus resulting in learning (Watkinson and Wall, 1979, p. 42). It was believed that in order for the feedback to be useful it would not only have to relate to the response itself but also to the preresponse information (prompts) given to the child. This concept was also discussed by Sulzer-Azaroff and Mayer (1977, p. 199).

The definitions of the feedback behaviors therefore parallel those of the prompting continuum. The behaviors were first categorized as physical, visual or verbal and defined as follows:

1) Physical feedback is that in which the teacher directly contacts the child to focus the child's attention on a specific feature within the previous skill performance.
2) Visual feedback are those behaviors which provide information by partial demonstration or a gesture about the previous response. These behaviors do not include any physical contact between the child and the teacher.

3) Verbal feedback can be words or sentences which give knowledge of results or specific reference to a movement during the previous response.

The paralleling of the feedback behaviors to the prompting behaviors followed through as much as possible in the levels as shown in Figure 5. Two levels were eliminated. Complete Manipulation and Complete Demonstration were not considered appropriate as feedback. These behaviors only repeat the skill or a visual representation of the skill. They would not be useful in providing specific information on important features of the child's skill performance. The levels of feedback within the categories and their definitions were developed as follows:

PHYSICAL FEEDBACK

Partial Manipulative Feedback

This level is specific in nature and directs the child to what body part did or did not have correct involvement. The feedback is given by having the teacher manipulate the body part in the correct manner while giving specific verbal information.

Example: The child was instructed and prompted to bend his knees while jumping down. In the postresponse phase, the teacher would bend the child's knees stating whether or not the child correctly bent his knees.

Touch Feedback

The teacher merely touches the specific body part of the child to focus on its involvement from the previous trial.

Example: The teacher touches the child's elbow to indicate that the child bent his elbow correctly or incorrectly during a throwing skill.

VISUAL FEEDBACK

Partial Demonstration

Teacher demonstrates that part of a skill that the child did or did not perform correctly.

Example: "Good try but you did not bend your arms when you ran." Teacher bends her arms.

Gesture

A gesture does not represent part of the skill but does focus attention on the body part or movement that was correct or incorrect. (The teacher may also gesture to a piece of equipment also.)

Example: The teacher points to the child's hands and says, "You held on tight that time."

VERBAL FEEDBACK

Cue Feedback

This is very specific information which is about a particular aspect of the skill performance. The verbal cue feedback attempts to focus the child's attention on a key feature of the skill just performed.

Example: If the instructor prompts for the child to jump but focuses on landing on two feet, then the feedback cue would be, "You didn't land on two feet."

Mand Feedback

This level of feedback is considered general in nature and tells the child if he performed the particular skill correctly or not. The mand must be used in the feedback otherwise the feedback might be reinforcement.

Example: The child kicks a ball and the teacher immediately says, "Good, you kicked the ball."

Knowledge of Results

This level of feedback gives less information about the specific skill the child performed. It only tells the child if his performance was acceptable.

Example: A child who is working at Target Skill level for Swing on a Bar may be told to "Do it!" If the child swings at the expected performance step, then the teacher would say, "That's right!" or "Okay, you did it."

These behaviors were meant to be implemented and faded as systematically as the prompting behaviors. To ensure this, a set of Feedback Strategies was developed to assist the teachers in implementing feedback behaviors. The strategies were based on matching the mode of feedback with the mode of prompt. The child would therefore be receiving information in the postresponse phase which directly related to the preresponse instruction as well as to the child's actual performance. The strategies suggested and used for this study are presented below:

1) Appropriate verbal feedback is paired with physical or visual feedback.
2) Mand Feedback is paired with Complete Manipulation and Complete Demonstration of a skill.
3) When a Manipulative Prompt is given which is specific in

nature to a certain body part or parts (i.e., head, hands, knees, etc.) then a Partial Manipulative Feedback should be given after the response using the same body part or parts in the same manner.

4) Touch Feedback is paired with Minimal Guidance which specifically prompted a certain body part. Therefore, the teacher may touch a child's hands to prompt for holding onto the bar. After the response, the teacher would again touch the child's hands and say, "Good, you held tight with your hands."

5) If a Partial Demonstration prompt is used which focuses on the movement of a specific body part or parts (i.e., foot, feet, knees, hands, seat, etc.) then the specific Partial Demonstration is repeated in postresponse with the appropriate verbal information. If, however, a Partial Demonstration is given to indicate what target skill is to be performed, then Mand Feedback should be used.

6) If a Gesture Prompt is used to indicate the movement of a specific body part or what piece of equipment is to be used, this should be used as Gesture Feedback.

7) When a specific Skill Cue is given, then the teacher gives Cue Feedback of the same nature. She does not give a specific cue of performance (i.e., "Good, you bent your knees") if the cue was not given in the preresponse phase.

8) When the child performs with a Skill Mand at any task step, the teacher should give Mand Feedback.

9) After two correct responses, the teacher should fade to Action Cue Prompt and Knowledge of Results Feedback.

Preresponse Prompt	response →	Postresponse Feedback
Complete Manipulation	—	Mand Feedback
Manipulative Prompt	—	Partial Manipulative Feedback
Minimal Guidance	—	Touch Feedback
Demonstration	—	Mand Feedback
Partial Demonstration	—	Partial Demonstration Feedback
Gesture	—	Gesture Feedback
Skill Cue	—	Cue Feedback
Skill Mand	—	Mand Feedback
Action Cue	—	Knowledge of Results

Figure 5. Pairing Mode of Feedback with Mode of Prompt

Reinforcement was included as part of the postresponse phase of instruction as a technique for increasing the frequency of a correct response. The use of reinforcement was monitored in order to ensure that there was some definite positive comments being given to the child. Essentially, reinforcement was coded for three categories (physical, visual and verbal) and included behaviors that contained no specific qualitative information on how well the response was performed only that it was acceptable or appropriate.

The definitions for the three categories were as follows:

1. Phsyical reinforcement include those behaviors in which the teacher directly contacts the child in order to show acceptable performance or affection (e.g., a hug, pat on the head or tummy).
2. Visual reinforcement includes any non-contact behaviors which give a general indication of approval (e.g., clapping or waving hands in the air).
3. Verbal reinforcement includes words or sentences the teacher uses to communicate a "good" performance and acceptable behavior (e.g., "That's good").

CHAPTER IV

METHODS AND PROCEDURES

Introduction

Previous educational studies, have rarely focused on individual teacher effectiveness, and those that did, might have produced useful findings except that their ratings have not proved reliable. Brophy and Evertson (1976) contend that raters have been inconsistent with their criteria and therefore results of various studies were incongruous. Rosenshine (1970) had also previously emphasized similar notions. She claimed that the use of category systems and rating systems as instruments of instructional observation offer weak information. Rosenshine defines the category system as a low-inference measure and the rating system as a high-inference measure. In the same article Rosenshine reports that although high-inference rating systems offer flexibility, the category system gives more specificity and objectivity of a teacher's behavior:

> ... evaluative reports based on high-inference measures may offer few specific suggestions for improving an instructional program. An evaluative report which suggests that teachers need to improve their clarity and organization, without giving the low-inference correlates of such behaviors, may amount to little more than suggesting that the teachers be "good and virtuous" (p. 282).

It is necessary therefore to develop a measurement instrument that identifies not only teaching behaviors but also incorporates some criteria for implementing those behaviors in an effective manner.

Another source of incongruous results in previous educational research, is that many of the studies evaluating curricula, often use an experimental group and a control group. The reason various studies differ in their results is likely because the investigators ususally ignore individual differences of teachers. Flanders (1970) comments on such designs:

> The most common research design (which leaves much to be desired) compares an "experimental treatment" group of classes with a control group ... (p. 11).

The key objection here is the design which uses "groups" and does not consider the interaciton analysis which presumably exists between "the treatment" and the teacher-pupil interaction.

Although the studies reviewed thus far have focused on normal classroom situations, similar concerns are evident in special education. Shores, Agelka, and Nelson (1973) report that teacher competencies for systematic teaching have not been behaviorally defined. The authors concluded that:

1) teaching strategies in specific programs do not provide for generalization, and
2) competency statements are not empirically validated.

An extensive research project on teaching behaviors was conducted by Brophy and Evertson (1976). This study attempted to identify characteristics of successful teaching behaviors. From these characteristics, the researchers expected to identify specific teaching competencies. A major problem was that much of the information gathered was based on surveys and questionnaires. The result was that there was a large volume of information on the characteristics of successful teachers (based on student's progress over five years). The volume of such information rendered it inapplicable to research or practice situations. There was no data on which to base decisions or recommendations for improvement in teaching techniques.

Brophy and Evertson therefore reaffirmed the conclusions of other researchers (Flanders, 1970; Rosenshine, 1970) that research has not adequately studied instructional behaviors. In fact, despite all the information Brophy and Evertson gathered, they emphasized that more percise research is needed:

> ... researchers, administrators, and others concerned with measurement of teacher effectiveness should concentrate their efforts on discovering cause and effect relationships that will help build up a knowledge base concerning effective teaching (p. 145).

Design

The purpose of this study was to determine if teachers could apply feedback behaviors during individualized instruction, using a system of strategies that was developed to promote the use of feedback resulting in more systematic teaching. The design used to examine the application of feedback by the teachers was an ABA time-series design.

The time-series design allows for continuous measurement which illustrates the gradual progress in the use of teaching strategies. During the baseline phase, data was gathered on the teachers' implementation of preresponse guidelines. A 50% reduction in errors was attained before postresponse strategies could be introduced. This criterion was considered reasonable for untrained teachers. The baseline data also included the frequency of feedback behaviors and the frequency of feedback errors per reponse trial. The treatment phase had the teachers implement feedback behaviors according to the strategies developed and being tested in this study. The followup phase illustrated the ability of the teachers to continue the use of feedback while maintaining low frequency of errors in preresponse and postresponse phses of instruction.

Individual data was collected on two sets of two teachers. The baseline and intervention phases were staggered over time, thus reducin reducing the potentially invalidating effects of historical events.

Population and Sample

The subjects were from a group of undergraduate physical education students at the University of Alberta in their third and fourth year of study. These students were enrolled in a practicum course in physcial education for the mentally retarded. The course is operated in the PREP Program for young mentally retarded children.

The sample group of teachers for this study had no previous exposure to the PREP Program or to any of its curriculum materials. The subjects also had no formal training in teaching mentally retarded people.

Participant Children

The four severely retarded children who received instruction from the subjects ranged in age from 4 years to 8 years and lived at home with their families. All were ambulatory and all except one child had no physical impairments. The one exception was a child with a slight impairment (spastic diplegia) which affected his balance. All of the children had been involved previously in the PREP Program. At the time of the study, the children had just commenced fall attendance at the Elves Child Development Centre and therefore had not been given instruction in PREP for at least five months.

These children were chosen on the basis of their relative emotional stability and also as those who could benefit from instruction on the assigned motor skills. Other children were not as suitable due to unpredictable behavior or multiple handicap conditions (e.g., blindness).

Treatment

The subjects applied PREP individual instruction strategies during a practicum lab session each Tuesday and Thursday from 12:30 - 1:45 p.m. There were three days of baseline for teachers A and B and four days for teachers C and D. The treatment phase consisted of four instructional days and three follow-up days for all four teachers (see Table 2).

The rationale for ending the baseline phase was primarily based on a 50% or greater reduction for at least one day in postresponse errors from the first day of baseline. The reduction was important in demonstrating that the teachers had attained some skill in applying the prompting continuum.

At the end of the baseline the teachers (subjects) were involved in two one-hour lectures on postresponse feedback behaviors. A training packet was presented consisting of feedback behavior definitions, feedback strategies and a guideline sheet on reinforcement.

The investigator explained the purpose and nature of feedback in the postresponse phase of instruction. It was stressed that appropriate feedback be given to the child after each response trial, and that the feedback be directly related to the child's previous performance.

Teacher Training

Before teachers began formal instruction, they were given information on the PREP curriculum and teaching techniques. There were three one-hour lectures which supplied information on assessment, task sequences, prompting, fading and monitoring of student progress. The lectures were based directly on the material provided in the PREP Manual (Watkinson and Wall, 1979). The teachers were then assigned a child and asked to practice teaching using the target skill 'Climb on a Box'. There were two sessions of practice teaching which allowed the teachers to become familiar with using the prompts during a practical situation. They were also instructed to record their teaching episodes on a Daily Progress Form (Watkinson and Wall, 1979). Since no specific teacher feedback behaviors were established by Watkinson and Wall prior to this study, the teachers were not given any specific instructions on the postresponse phase of instruction. The teachers were told, however, that some form of reinforcement or performance evaluation (good, correct or incorrect) should be given after each of the child's responses.

A fourth and fifth lecture session was used to introduce the set of preresponse rules which were thoroughly explained to the

TABLE 2

PHASES OF EXPERIMENTAL DESIGN
DURING INSTRUCTIONAL SESSIONS

TEACHERS A and B

Sessions 1-3	Sessions 4-7	Sessions 8-10
Baseline	Treatment	Follow-Up
- Teachers given information about prompting errors with use of videotapes.	- Teachers use feedback during instruction. - Teachers given information about their feedback errors.	No information given to teachers about their errors.

TEACHERS C and D

Sessions 1-3	Sessions 4-7	Sessions 8-11	Sessions 12-14
No involvement	Baseline	Treatment	Follow-Up
	- Teachers given information about prompting errors with use of videotapes.	- Teachers use feedback during instruction. - Teachers given information about their feedback errors.	- Teachers given no information about their errors.

teachers. The purpose of these rules was to give the teachers specific criteria for applying and fading prompts in the preresponse prompting continuum. During the fifth lecture the teachers were given the task sequences that they were to teach during the study as well as the names of the children they were to instruct. It was emphasized that the teachers be very familiar with the task sequences for Jump Down and Swing on a Bar and the description of teaching behaviors for each of the prompts (see Appendix B). At this point, baseline teaching began. Data was collected for frequency of preresponse errors (according to preresponse guidelines), frequency of feedback behaviors and the frequency of feedback errors (according to postresponse strategies). The investigator continued training in preresponse techniques by reviewing the videotaped teaching episodes with each teacher. Errors in prompting and fading were pointed out and corrections were suggested.

At the end of the baseline period the teachers were given a further addition to their training packet. The addition included handouts containing feedback behavior definitions and a list of strategies to be followed relating to the systematic implementation of the specific feedback behaviors. Two one-hour lectures were given to instruct and explain to the teachers how and why the postresponse behaviors were to be used during the instructional episodes. The teahcers were asked to follow the feedback strategies without trying to question or justify them any further than the investigator's explanation.

The teachers were videotaped during each instructional epidsode which lasted as long as the teacher felt necessary. The teachers were encouraged to get at least three responses in order to evaluate and record the child's typical response. The following day each teacher viewed her teaching episodes with the investigator. Information concerning feedback behaviors and errors in strategy were explained along with recommendations for the next instructional session.

After each of the next four sessions, the teachers continued to meet with the investigator to view the videotapes. The researcher's comments focused on the postresponse feedback behaviors and strategies. Errors in feedback were indicated and corrections were presented.

After the fourth treatment session, the teachers continued teaching for three more sessions; however, they were not given any information on their teaching strategies. They were instructed to continue teaching using the preresponse and postresponse behaviors and the strategies for which they had been given training.

Target Skills

Each of the teachers was assigned two children for instruction (see Table 3). Teacher A taught child 1 and 2 Jumping Down and Swing on a Bar respectively. Teacher B taught child 2 Jumping Down and child 1 to Swing on a Bar. Teacher C taught child 3 the target skill Jump Down and taught child 4 to Swing on a Bar. Teacher D taught the opposite skills to each child. The teachers were required to provide each child with two instructional episodes per day for each skill.

The order of instructional episodes was randomly asssigned each day so as to ensure no reactive effects from experimental time arrangements. Teachers were not given any other information regarding length of teaching episode or instructional procedures during the daily sessions.

TABLE 3

THE DAILY TEACHING ASSIGNMENT FOR THE FOUR
TEACHERS DURING THE STUDY

Teacher	Child	Target Skill
A	1	Jump Down (2 episodes)
A	2	Swing on a Bar (2 episodes)
B	1	Swing on a Bar (2 episodes)
B	2	Jump Down (2 episodes)
C	3	Jump Down (2 episodes)
C	4	Swing on a Bar (2 episodes)
D	3	Swing on a Bar (2 episodes)
D	4	Jump Down (2 episodes)

Rationale for Target Skills

The target skills, Jumping Down and Swing on a Bar were the only skills assigned for instruction during the study. By using these two skills there was an attempt to ensure that the treatment could be applied in the same manner by all teachers and that by using only two skills, there was a limit to the amount of information (task sequences and prompting behaviors) that the coders would have to learn.

The main consideration, however, was that these skills are both discrete skills. Discrete skills facilitate easier evaluation of a response and make it possible to distinguish between one teaching trial and the next. The teacher, therefore, can give preresponse prompts, evaluate the response and follow-up with immediate feedback. It follows, then, that the observers would also find it easier to distinguish the three phases of the teaching trial (preresponse, response, postresponse).

ABA Time-Series Design

Rationale

The ABA time-series design adds strength to the controlling effects of intervention, especially if the results are replicated across different subjects. If experimental control is obtained through such a design, then the only plausible cause of change in behavior would have to be the natural history of that behavior within the study (Hersen and Barlow, 1976). The return to baseline phase of this deisgn enables the researcher to analyze the strength of the intervention. The investigator must be aware that in learning situations a return to the original baseline will probably not occur (Kratochwill, 1978, p. 42). It would be expected then that the learning would be maintained for some period of time.

Specific Design

The present study required that individual teachers be observed, in order to gain as much information on teaching behaviors as possible. As previous literature has indicated (Flanders, 1970; Rosenshine, 1970), the data of individual teachers are more valuable and easier to interpret realistically than group data. Data were collected on two sets of two teachers. The baselines and intervention were staggered over time which gives the design a multiple baseline characteristic (see Figure 6).

The staggering of the baseline in this study was an attempt to prevent the second group of teachers from observing and learning feedback behaviors from the first group of teachers. During the baseline the teachers were given detailed information on preresponse teaching behaviors which resulted in them concentrating on those rather than having time to observe and analyze the other set of teachers. On the other hand, an extended baseline for Group II may have caused some reactivity as Horner and Baer (1978) discussed. The multiple-probe which the authors recommend as an alternative might have been used, however that would not have been a realistic teaching situation since teachers are required to continue teaching once the instructional program begins. The staggering of the baseline and the intervention replicates the effects over time thus allowing for experimental control and eliminating historical invalidating influences (Kratochwill, 1978, p. 70 and 73).

Internal and External Validity

The use of the ABA time-series design requires that the researcher account for several weaknesses in internal validity. The weaknesses which apply to this design include many of those common to other time-series designs. As indicated by Kratochwill (1978, p. 18) the threats

GROUP I	TEACHERS	A	$O_1 O_2 O_3$	$I_1 O_4 I_1 O_5 I_1 O_6 I_1 O_7$	$O_8 O_9 O_{10}$	
		B	$O_1 O_2 O_3$	$I_1 O_4 I_1 O_5 I_1 O_6 I_1 O_7$	$O_8 O_9 O_{10}$	
GROUP II	TEACHERS	C		$O_1 O_2 O_3$	$I_1 O_4 I_1 O_5 I_1 O_6 I_1 O_7$	$O_8 O_9 O_{10}$
		D		$O_1 O_2 O_3$	$I_1 O_4 I_1 O_5 I_1 O_6 I_1 O_7$	$O_8 O_9 O_{10}$

Figure 6. The ABA time-series design showing multiple baseline characteristic

to internal validity include: history, maturation, testing, instrumentation, instability, change in unit composition and reactive intervention.

Although history could quite likely be a threat to this study, it was controlled for by the staggering of the baselines and intervention. With continuous measurement of the teacher's instructional episodes, any events affecting behavior other than treatment would probably have been detected. These two factors therefore would seem to effectively reduce any historical confounding.

Maturation could possibly have caused confounding although 10 instructional sessions was a relatively short period of time for untrained teachers to develop systematic teaching strategies. However once the teacher grasped the preresponse behaviors, she may have naturally begun to use feedback behaviors. It would seem somewhat unlikely however that all the teachers would grasp the behaviors and strategies within the time span of 10 teaching sessions. Also because previous research in PREP (McIsaac, 1980) established that experienced teachers were not systematically fading, it would be safe to assume that feedback behaviors would not occur systematically through maturation.

Testing would most definitely be a threat in this study. The teachers were aware of being observed (video taped) during each teaching episode. Also, they were given specific feedback on their errors which would cause the subjects to be highly sensitive. The nature of this study was such that it necessitated this sensitivity to testing.

The threat to internal validity caused by instrumentation was controlled by videotaping the teachers in the same manner and by randomizing the order of instruction daily. The behaviors being observed and their system of implementation were specifically defined. To resolve any disagreements the observers referred directly to the definitions and strategies as well as the specific examples given in the handout material.

Confounding effects from instability could have existed during this study due to the variability of performance of the mentally retarded students. The mentally retarded children often vary in their attention, motivation and their emotional status which affects their performance. This could have caused the teachers to react differently during instruction with their students. The change of a task step (e.g., moving from the requirements of Task Step One to Task Step Two) would seem to have also caused variability in the teachers' performances. This could have been as a result of the new information the teacher was having to give to the child, and also due to the adjustments the child was making to the additional criteria of the new task step. These factors have to be considered as adjustments which would normally occur during instruction but which might be reduced in their effect with more teaching experience.

The subjects of this study remained the same throughout and the threat to internal validity due to change in experimental unit composition was not a factor.

Reactive intervention did not pose a strong threat because intervention was based on data from the preresponse phase of instruction. Data during baseline reflected errors in preresponse as well as postresponse, however it was the number of errors in preresponse which determined when treatment began. The intervention began then when preresponse errors were reduced, which was independent of the baseline data for feedback errors.

Although the prime concern of the investigator must be experimental control (internal validity), the researcher is still faced with the problem of external validity. Kratochwill (1978) notes that the researcher must consider population and ecological invalidating influences which might reduce the generality of the study. In order to generalize, the researcher must draw randomly from the accessible and the target populations (Kratochwill, 1978, p. 21). The present study has drawn only from an accessible population and therefore the results refer only to the untrained and inexperienced teachers of the mentally retarded.

The extent to which the ecological or environmental conditions could be replicated and generalized in other situations is determined by addressing ten threats to ecological validity (Kratochwill, 1978, p. 28). These threats involve: describing the independent variable explicitly, Hawthorne Effect, novelty and disruption effects, experimenter effects, pretest sensitization, post test sensitization, interaction of time of measurement and intervention effects, history, measurement of the dependent variable and referent generality.

The independent variable was explicitly described by specific behavioral definitions of both the feedback behaviors and the feedback strategies. All behaviors coded for on the observation instrument were defined for both teacher and child. Specific examples of the behaviors and their implementation were also included.

The Hawthorne Effect was an obvious threat to external validity. The difficulties posed in accurately videotaping the teachers resulted in their awareness of being observed. This is a common fault of observational research in a teaching situation and is difficult to control.

The effects caused by novelty and disruption along with experimenter effects were involved as part of the treatment. These effects were unavoidable by the nature and purpose of the study. For the teachers, the novelty of reviewing their teaching behavior on videotape and simultaneously receiving feedback from the experimenter, was part of the experimental treatment. The experimenter effects however may have been a factor with the second observer. The researcher could have unintentionally influenced the expectations of the observer. To control for such effects, the second observer did not always see all of the teachers' episodes each day and did not always observe the same teachers each day.

The threat to external validity due to pretest sensitization was not a factor, as there was no pretest on feedback for the teachers. The subjects were totally unaware during baseline, that feedback behaviors were being recorded. Therefore, whatever feedback behavior occurred during baseline instruction, occurred naturally.

Post test sensitization was not a concern, as the teachers were continuously observed for each teaching episode. The teachers were videotaped and observed in the same manner each instructional session.

The continuous measurement of a time-series design effectively limits the effects due to interaction of time of measurement and intervention effects. The last three instructional sessions did not include any feedback to the teachers. It was expected that the teachers would maintain the behaviors as they occurred during intervention. It would however have been interesting to again observe the teachers later in time or preferably to continue measurement unobtrusively.

The threat caused by history was addressed by continuous measurement which should indicate any uncharacteristic change in behavior. Also, by staggering the baseline and intervention of the two sets of teachers, the experiment is considered to be replicated over time (Kratochwill, 1978, p. 70).

The effects due to the measurement of the dependent variable are addressed by specific behavioral definitions of all teacher behaviors. The concept of inclusion of feedback behaviors is valid based on previous studies (Whincup, 1978; McIsaac, 1980) which have included feedback as part of the teacher postresponse behaviors. The concept of the feedback strategies is assumed valid for this study due to an inability of previous research to prove independence of preresponse or postresponse behavior as the necessary determinant in learning new skills (Buell et al., 1968; Hardiman et al., 1975; Filler, 1976; Close et al., 1978; McClellan and Willis, 1979).

Referent generality (Kratochwill, 1978, p. 50) refers not only to the external validity but also to the phenomenon or concept under study. The investigator should not only be conscious of the behavior that is being changed but also how this behavior change may affect non target behaviors. The researcher may then be able to discuss the range of possible outcomes to be measured in a given study.

The amount of referent generality could be considered weak in the present study. The true function of information feedback and the identification of the most effective teaching behaviors are not tested in this study. The results of the present study are limited to determining the ability of the teachers to use feedback during instruction. Further clinical testing would be necessary to discover the true effect of the teacher's feedback on a child's performance.

The Instrument

The instrument used for recording the episodes allowed for the analysis of the preresponse, response and postresponse phases of instruction. The researcher was then able to examine the appropriateness of the behaviors omitted by the child and the teacher.

The observation instrument was basically the same as that used by

McIsaac (1980) with the exception that the pre-instruction phase of the episode was deleted. The preresponse prompts remained the same and the response category was coded as correct (C), resisted (R), incorrect (X) or no response (N). Correct and incorrect responses were coded on the observational sheet based on the teacher's verbal evaluation. If the teacher indicated to the child that the response was correct or incorrect then the observers coded the appropriate response. However if the teacher's evaluation was wrong (the teacher says "Good" when the response was incorrect) then an error was coded (see preresponse guideline #10). "Resists (R) or "no response (N)" were coded on the basis of specific definitions (see Appendix A). The postresponse feedback behaviors were modified and the general categories of reinforcement (physical, visual, verbal) were included. A "Task Step" column was also added. The number of the task step was verbally dubbed onto the videotape when the teacher gave this information to the camera operator (before the teaching episode began). The observers then recorded this during coding sessions.

In all there were nineteen teacher behaviors and four child behaviors which were coded during the study (see Figure 11). The teacher behaviors included nine preresponse prompting behaviors, seven feedback behaviors and three categories of reinforcement. Lastly the observation instrument included a section for recording the specific number of preresponse and postresponse errors. These errors were coded when teachers violated the preresponse guidelines and postresponse strategies given to them during training.

The instrument was considered valid since it has been previously tested (Whincup, 1978) and implemented in teacher evaluation (McIsaac, 1980). The addition of feedback behaviors did not pose a threat to the

PRERESPONSE

Physical

Complete Manipulation
Manipulative Prompt
Minimal Guidance

Visual

Complete Demonstration
Partial Demonstration
Gesture

Verbal

Skill Cue
Skill Mand
Action Cue

RESPONSE

Correct
Resist
Incorrect
No Response

POSTRESPONSE

Physical Feedback

Partial Manipulative
Touch Feedback

Visual Feedback

Partial Demonstration
Gesture

Verbal Feedback

Cue Feedback
Mand Feedback
Knowledge of Results

Reinforcement

Physical
Visual
Verbal

Figure 6a. Behaviors Included On the Observation Instrument

validity of the instrument, since these behaviors were behaviorally similar to the preresponse prompts. The feedback behaviors have, at least in part, been identified in the literature as behaviors that are frequently used in teaching (Close et al., 1978; Filler and Bricker, 1976; McLellan and Willis, 1979). However the complexity of the instrument was significantly increased by the addition of the feedback behaviors and the errors, so that reliability may have been adversely affected (Hawkins and Dotson, 1973; Johnston and Bolstad, 1973, p. 17).

Establishing Interobserver Agreement

Interobserver agreements were initially established prior to the collection of data through observer training sessions. The main observer for this study was the investigator. A second observer was used for reliability checks during the study. The second observer was already very familiar with the definitions of the prompting behaviors because of her previous experience in the PREP Program. Therefore, training was only necessary for the preresponse guidelines, feedback behaviors, and feedback strategies. Training took place over five sessions of approximately one hour each.

During the first three sessions the observers reviewed the material in the training packet which included: preresponse guidelines, feedback behavior definitions, feedback strategies, task sequences and coding instructions (see Appendix A). These initial sessions involved examining the guidelines, definitions and strategies to clarify their meaning and purpose. Coding procedures were introduced (rules and symbols) along with a sample coding sheet.

The next two sessions involved observing videotaped teaching episodes from the PREP Program with the teaching behaviors being identified and recorded. Disagreements were resolved through follow-up discussion and further review of the training materials.

Because teachers in the PREP Program had been previously trained only in the preresponse behaviors, the videotaped episode contained very few samples of feedback. Therefore it was difficult to get a realistic observer training agreement. The videotapes then, were used to assure agreement in identifying teacher prompting behaviors and any errors in preresponse fading, according to the guidelines implemented for this study. It was expected that feedback behaviors would not be difficult to identify since the definitions closely paralleled those of the prompting continuum. The training sessions, then, were directed towards reducing disagreements in identifying teacher behaviors.

It was reasoned that if the observers were identifying and recording the behaviors as they occurred, then the preresponse and postresponse errors could be determined in relation to the guidelines and strategies. When the disagreements in identifying behaviors appeared to be adequately eliminated the study began.

The interobserver agreements during the study were calculated using the recording of preresponse and postresponse errors. The dependent measures therefore included the errors committed in implementing the preresponse guidelines and feedback strategies developed for this study. If the observers agreed on the specific errors committed then it followed that agreement existed in the recording of the teacher behaviors.

The observers encountered problems in coding behaviors and errors due to unexpected mistakes by the teachers. For example, the teachers unintentionally jumped from task step one to task step two by cueing inappropriately. The teacher would instruct the child to perform according to criteria included in task step two even though the child had not achieved all the requirements of task step one. The problem therefore for the observers was to decide if an error should be recorded for each prompt in each trial or for the first trial only. Problems such as this required additional coding rules.

The procedures for observer reliability checks then were established as follows:

1) the researcher coded all the teaching episodes
2) the interobserver reliability check was done on 20 to 25% of the episodes by the second observer who randomly chose which episodes were to be overlapped
3) the researcher sat with the second observer while she recorded the preresponse and postresponse occurrence of behaviors
4) the preresponse and postresponse errors were then recorded by each observer independently and percent agreement was calculated using the formula:

$$\frac{\text{number of agreements}}{\text{number of agreements + disagreements}} \times 100.$$

The observer agreement check was done on a scored-interval basis (Hawkins and Dotson, 1973). Agreements were scored when both observers coded the same error (identified by number) in the particular performance trial. Disagreements were scored if each observer recorded a different error (identified by its guideline or strategy number) or if only one observer recorded an error in the particular performance trial.

The method of using scored-intervals is discussed by Hawkins and Dotson (1973). The scored-interval (S-I) agreement score ignores all intervals in which neither observer scored the behavior as occurring. Although Hawkins and Dotson state that this is a very stringent test of observer agreement, it does test the adequacy of response definitions.

Therefore the purpose of using such a stringent observer reliability check was to severely test the clarity and consistency of the feedback strategies. This would eventually assist the researcher in making recommendations for revision or elimination of feedback strategies.

The interobserver agreement percentages are displayed in Tables 4, 5 and 6. The range of percent agreement for all coded errors on a daily basis was 40% - 100% with the average percent agreement being 80%. This meets acceptable observer agreement standards (Kazdin, 1977, p. 142; Johnson and Bolstad, 1975, p. 17).

Treatment of the Data

The preresponse data were included initially to determine if the teachers were systematically employing the preresponse prompting continuum. Throughout the study these data were recorded to see if the low frequency of preresponse errors could be maintained or if the introduction of feedback strategies had an adverse affect on the prompting.

The frequency of occurrence of feedback and the frequency of both preresponse and postresponse errors per trial are displayed in a summary table. To examine the relationship and trend of the teachers' preresponse and postresponse behaviors, the data were plotted on individual graphs as frequency of occurrence per trial over sessions. The graphic presentation was subjected to visual analysis with specific scrutiny of trend and variability of performance.

Kratochwill (1978) reports that Glass et al. (1975) and Jones et al. (1975) claim visual analysis has proven just as effective and possibly more conservative in detecting significant and nonsignificant results. Kratochwill goes so far as to state that when treatment results are replicated more than once, visual analysis may further reduce the

TABLE 4

THE MEAN PERCENT AGREEMENT OF ALL THE ERRORS FROM EACH DAY OF RELIABILITY OVERLAP

Preresponse	Postresponse
92%	86%

TABLE 5

INTEROBSERVER AGREEMENT FOR EACH PRERESPONSE GUIDELINES FROM THE OVERLAP SESSIONS

Presresponse Guideline	Agreements	Disagreements	Percent Agreement on Scored Intervals
1	10	3	-
2	21	1	95.5
3	11	2	84.6
4	2	3	*40.0
5	2	0	100.0
6	No occurrences during reliability checks		-
7	1	3	*25.0
8	1	0	100.0
9	1	0	100.0
10	8	1	88.8
11	2	0	100.0
			$\bar{x}$ = 81.5

*Below acceptable interobserver agreement standards

TABLE 6

INTEROBSERVER AGREEMENT FOR EACH POSTRESPONSE STRATEGY FROM THE OVERLAP SESSIONS

Postresponse Strategy	Agreements	Disagreements	Percent Agreement on Scored Intervals
1	No occurrences during overlap		-
2	57	5	91.9
3	4	0	100.0
4	2	3	*40.0
5	2	1	66.6
6	No occurrences during overlap		-
7	8	3	72.7
8	7	10	70.0
9	3	0	100.0
			$\bar{x}$ = 77.3

*Below acceptable interobserver agreement standards

probability of a Type I error (Kratochwill, 1978, p. 113).

The graphic analysis presents the frequency of feedback behavior and the frequency of feedback errors per trial over sessions. The dependent variables were examined on a per trial basis because number of trials varied during each teaching episode.

Data Collection Procedures

The equipment was set up similarly each day for the subjects to conduct the teaching episodes. This aided in the videotaping of the teachers' actions and the recording of the verbal behaviors.

The baseline videotaping of the first set of teachers was done with one color camera. In order to be able to record all the required teaching episodes within the class time period, a second camera was required when the second set of teachers began teaching.

After each daily session the researcher viewed and coded the behaviors of the teachers in each teaching episode. During 20 to 25% of the episodes the second observer was also recording in order to establish interobserver agreement and observer reliability.

CHAPTER V

RESULTS

This study attempted to address three problems which relate to teaching within the PREP Program. The first two problems required that specific feedback teaching behaviors be identified and that a logical system of strategies for implementing the feedback behaviors be devised. These were addressed by developing a feedback continuum of specific behaviors within the categories of physical, visual, and verbal behaviors. The feedback strategies were essentially based on the suggestion that the mode of feedback be paired with the mode of prompt given by the teacher.

The third problem identified in this study was to examine whether inexperienced teachers could be trained to use the feedback behaviors in conjunction with the feedback strategies. The teachers were presented with materials that explained the teaching behaviors previously developed in the PREP Program (Preresponse Prompting Continuum) along with preresponse guidelines. During the treatment phase, or introduction of feedback during teaching, the teachers were given behavior definitions and strategies for feedback. Training sessions also included reviewing videotapes of the teachers during instructional sessions. Data were collected during the study on the frequency of errors which were committed by the teachers (subjects). The data were expected to indicate if the teachers were able to follow the guidelines and strategies.

The results for all four subjects are summarized in Table 7 over the three experimental phases. The teachers provided between four and

TABLE 7

A SUMMARY OF ALL THE TEACHERS: THE PRERESPONSE ERRORS AND POSTRESPONSE FEEDBACK BEHAVIORS AND STRATEGIES

Teacher	Average no. of trials/ episode	Average no. of teacher preresponse errors/trial	Average no. of teacher feedback errors/trial	Average frequency of feedback behavior/trial	Ratio feedback errors to feedback behavior/trial	Average reinforcement per trial
A						
Baseline	4.2	.56	.94	.64	1.47	.98
Treatment	4.1	.37	.50	1.23	.41	1.06
Follow-Up	3.8	.44	.85	2.00	.42	.96
B						
Baseline	4.2	.62	1.16	.12	9.67	1.12
Treatment	4.7	.45	.62	.96	.65	1.05
Follow-Up	4.1	.50	.32	1.12	.29	1.18
C						
Baseline	5.2	.38	.59	.48	1.23	1.35
Treatment	5.4	.29	.35	1.16	.30	.98
Follow-Up	4.8	.26	.45	1.65	.27	1.34
D						
Baseline	5.8	.36	.69	.35	1.97	.97
Treatment	5.9	.19	.25	1.26	.20	.77
Follow-Up	6.6	.14	.16	.86	.19	.79

five trials during each of the two daily teaching episodes. This was generally maintained throughout the treatment and follow-up except that Teacher A did drop to an average of 3.8 trials per episode during follow-up. Preresponse errors were reduced during baselines, however it is interesting to note that the average errors for Teacher A and B were higher throughout the study than for Teachers C and D. Also the preresponse errors for the first set of teachers (A and B) increased during follow-up while teachers C and D continued to decrease their preresponse errors.

During the treatment phase, the teachers increased the average frequency of the feedback behaviors. After relatively high baseline rates of feedback error, the teachers decreased their errors during treatment. Teacher A returned to high rates of error following treatment while the other teachers maintained or lowered the errors on the average.

The ratio column indicates the ratio of the frequencies of feedback errors to feedback behaviors. The ratios clearly decrease during treatment and are generally maintained during follow-up sessions.

The final column indicates the average frequency of reinforcement per trial for baseline, treatment and follow-up phases for each teacher.

Baseline Phase

The purpose of the baseline period of instruction was to develop the teachers' use of the preresponse prompting continuum. The graphs (Figures 7 to 10) illustrate that all of the teachers reduced

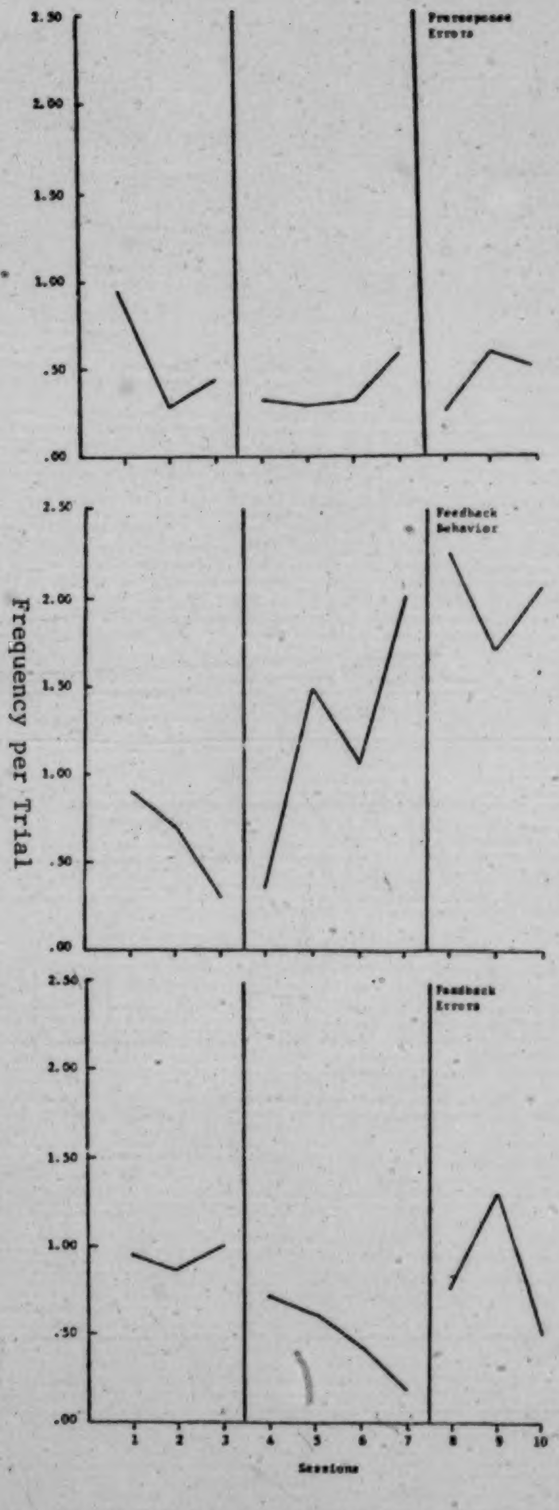

Figure 7. Frequency of Preresponse Errors, Feedback Behavior, and Feedback Errors for Subject A.

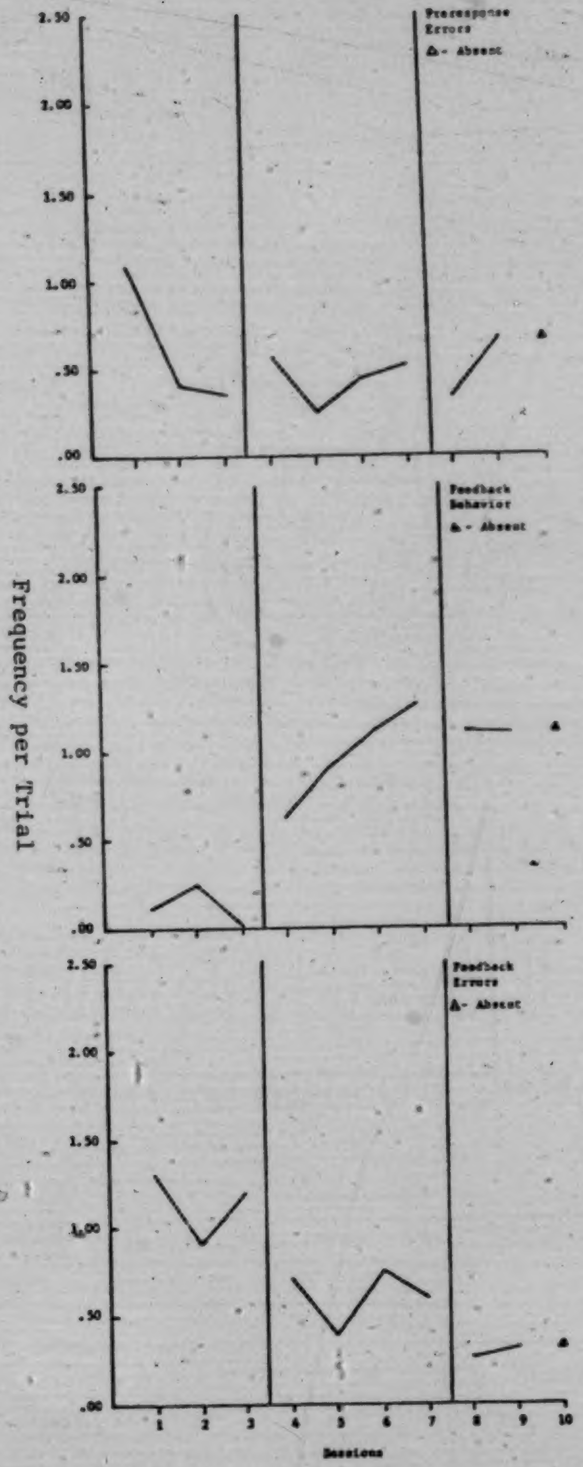

Figure 8. Frequency of Preresponse Errors, Feedback Behavior, and Feedback Errors for Subject B

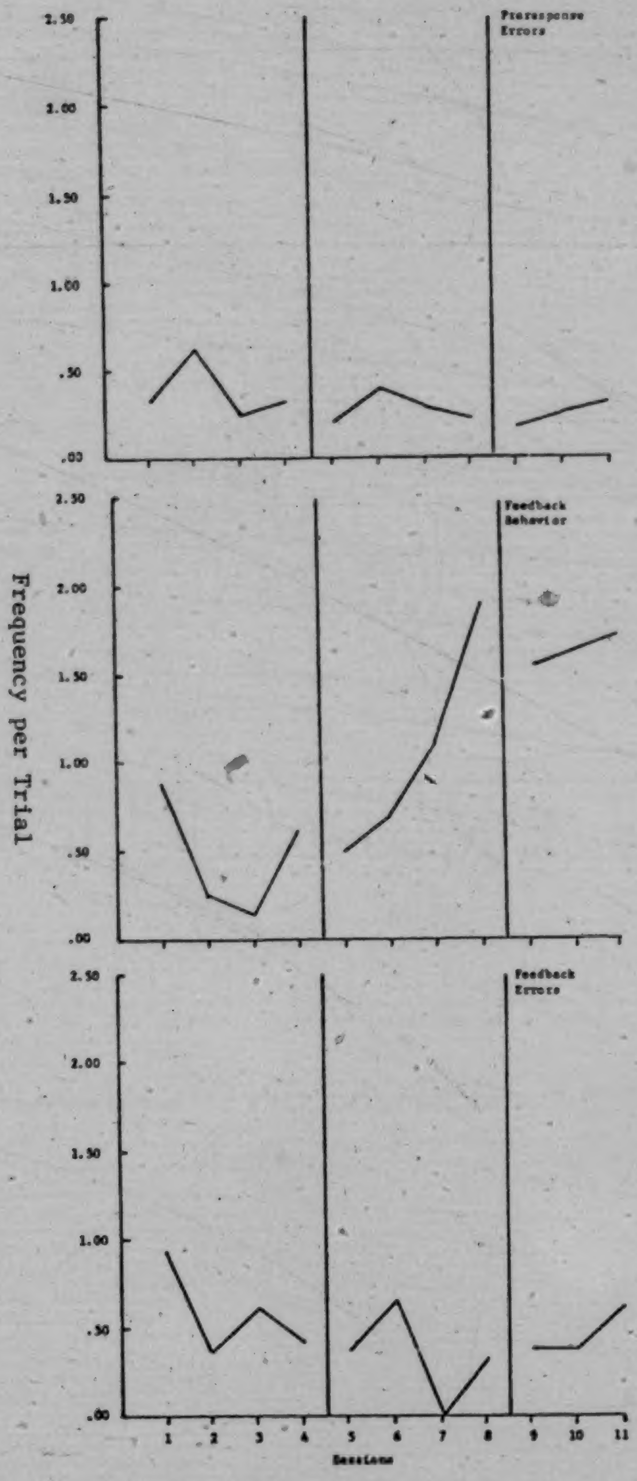

Figure 9. Frequency of Preresponse Errors, Feedback Behavior, and Feedback Errors for Subject C.

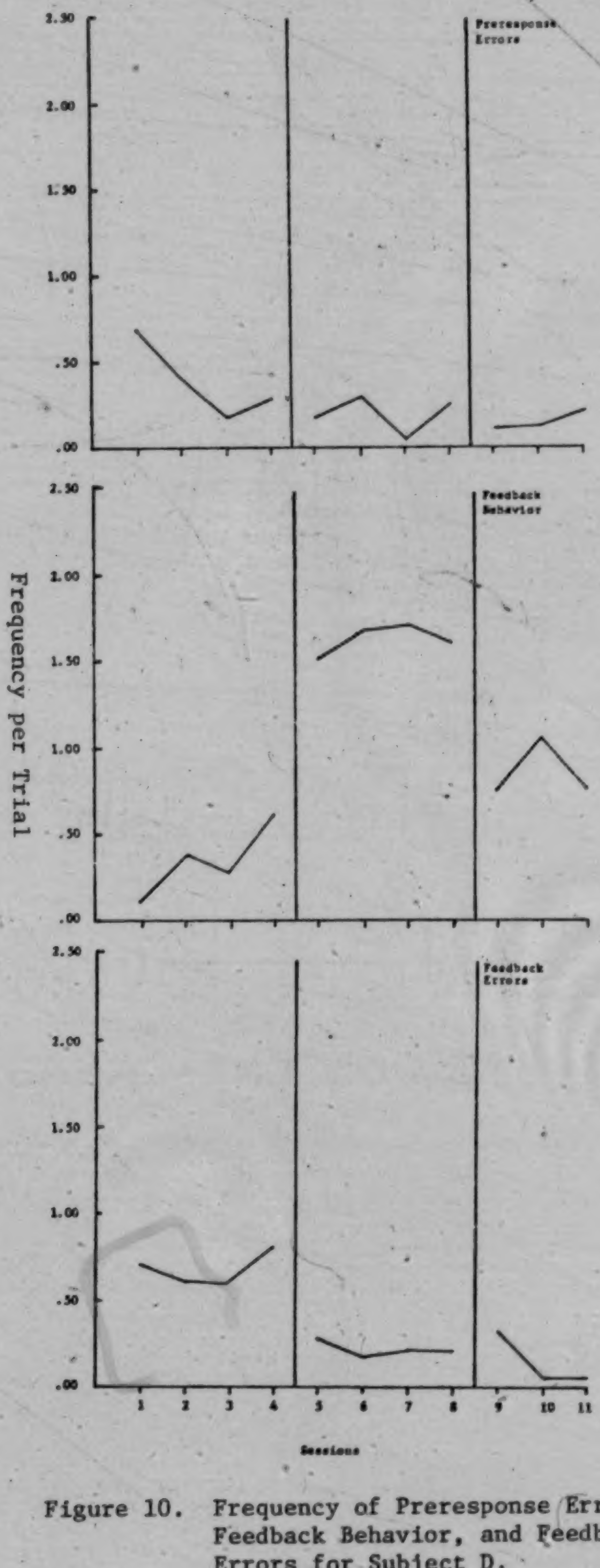

Figure 10. Frequency of Preresponse Errors, Feedback Behavior, and Feedback Errors for Subject D.

their preresponse errors by at least 50% for at least two days. The graphs also indicate that even though there was little feedback occurring, the frequency of error was equal to or greater than the behavior frequency. This is because errors were recorded if feedback would have been appropriate but was not given by the teacher.

Treatment Phase

During the second phase of the study, the preresponse errors remained near or below the baseline level. For all the subjects, the preresponse errors were well below one error per trial (Figures 7 to 10).

The teachers showed an increase in the frequency of feedback behavior and a decrease in the frequency of feedback error (less than 1 per trial). This was especially evidenced with Teachers A and D (Figures 7 and 9) who reached feedback frequencies of approximately 1.20 per trial and had low error frequencies of .50 per trial and .25 per trial respectively. The feedback behaviors of Teacher C (Figure 9) increased during treatment although there may have been a trend toward this indicated at the end of baseline. The frequency of feedback errors for Teacher C differs from baseline only in the third day when the error frequency was zero. It might be remembered, however, that Teacher C had the fewest errors during baseline with an average of .59 per trial (see Table 7).

Teacher B's feedback behavior (Figure 8) did not reach as high a frequency as the other teachers. However, her data indicates the same trend in behavior frequency as the other three teachers.

Follow-up Phase

Generally the overall behavior trends remained the same during the three follow-up sessions as they were during treatment. During this time the teachers received no information from the researcher regarding their errors.

The low frequency of preresponse errors continued for all four teachers (less than 1 per trial; see Figures 7 to 10 and Table 7).

The frequency of feedback behavior for Teachers A, B and C (Figures 7, 8 and 9) remained above one per trial. Teachers A and C had a frequency greater than 1.50 behaviors per trial and Teacher B had a frequency of approximately 1.10 feedback behaviors per trial. Teacher D (Figure 10) had a decrease in feedback behavior, but the frequency was still above the baseline level.

The errors in feedback continued to decrease for Teachers B and D (Figures 8 and 10) during the follow-up phase. Teacher A (Figure 7) exhibited a marked increase in error during the first two days of follow-up, although the frequency returned to within the treatment range on the third day.

Within Subject Variability

After the baseline phase, the teachers exhibited little variability in preresponse errors throughout the study.

There was some variability, however, in the frequency of feedback error by individual teachers during the treatment and follow-up sessions. The most noteworthy is in Teacher C's data (Figure 9).

The first two days of treatment show the error frequency of feedback to be similar to the baseline. On the third day, however, the errors drop to zero and increase again to almost baseline level on the fourth day.

Variability of feedback errors during the follow-up was evidenced in Figure 7. On the second day, error frequency rose higher than baseline and treatment level, and then returned to .50 errors per trial.

Between Subject Variability

The preresponse errors of the first set of teachers (A and B) show higher frequencies (Figures 7 and 8) at the start of baseline than those of the second set of teachers (C and D) whose frequencies were well below one per trial. Teachers A and B had preresponse error frequencies of .90 and 1.10 errors per trial respectively. Teachers C and D had .34 and .67 errors per trial on the first day of baseline.

Teachers A and C (Figures 7 and 9) began the baseline with high frequencies of feedback behavior (.90 and .87 respectively). In contrast, Teachers B and D began with very low frequencies of feedback (.12 and .13 respectively) on the first day of baseline.

Guidelines and Strategies

Tables 8 to 11 show each subjects' daily errors for individual preresponse guidelines and postresponse strategies. It should be noted that after the first session for Subjects A and B, two preresponse guidelines were added. These were necessary because the teachers made two errors which had not been anticipated and became apparent during the first day of instruction.

TABLE 8

Frequency of Errors for Each Preresponse Guideline and Postresponse Strategy For Each Session

SUBJECT A

PRERESPONSE GUIDELINE	SESSIONS 1	2	3	4	5	6	7	8	9	10
1	6				1	2				
2	4	2	4		3	3	3	4	2	4
3			1				3			
4			1							
5										
6									6	
7				1						
8										
9	2									
10	1	1								
11	8	1		2						

POSTRESPONSE STRATEGY	SESSIONS 1	2	3	4	5	6	7	8	9	10
1					2	1				
2	13	6	10	4	8	2	10	10	3	2
3										
4			5				1	1		1
5						1	1			
6										
7	7	6		6		3		1	2	1
8				5						
9				1						

TABLE 9

Frequency of Errors for Each Preresponse Guideline and Postresponse Strategy For Each Session

SUBJECT B

PRERESPONSE GUIDELINE	SESSIONS 1	2	3	4	5	6	7	8	9	10
1	7		1	1			1			
2	4	4	4	4	3	4	4	4	2	
3	1		[illegible]	2	1			1		A
4	1									B
5				1						S
6									1	E
7	3									N
8				1		1				T
9				1					1	
10	5	1		4	1	1	3		1	
11	2	1							1	

POSTRESPONSE STRATEGIES	SESSIONS 1	2	3	4	5	6	7	8	9	10
1	6									
2	14	9	9	4	4	10	6	2		
3							2			A
4			8	2		1				B
5		2		3						S
6										E
7	8	3		7	3		1	1	3	N
8				3	1	1		1		T
9										

TABLE 10

Frequency of Errors for Each Preresponse Guideline and Postresponse Strategy For Each Session

SUBJECT C

	SESSIONS										
PRERESPONSE GUIDELINE	1	2	3	4	5	6	7	8	9	10	11
1		4		2		2		1		1	1
2	5	1	3	1	1		2	2	2	1	2
3		2	3		1	2	4	2	1		
4						2	1				
5				1							
6										3	2
7	1			1	1						
8											
9											
10	1	3	1	1		2			1		1
11				1			1				

	SESSIONS										
POSTRESPONSE STRATEGIES	1	2	3	4	5	6	7	8	9	10	11
1											
2	9	6	14	5		5		3	3	1	
3	4										
4									1	4	7
5											
6											
7	4				4	3		4	4	1	4
8		1	2	1	2						
9				2	1						

TABLE 11

Frequency of Errors for Each

Preresponse Guideline and Postresponse Strategy

For Each Session

SUBJECT D

	SESSIONS										
PRERESPONSE GUIDELINE	1	2	3	4	5	6	7	8	9	10	11
1	7			1				1			3
2	1	1		2	3	2				2	
3	2			2		2	1	1		1	
4											
5						1		1			
6											1
7	1				1						
8											
9											
10	3	3	4	3	1	1		3	2		2
11		1	2								

	SESSIONS										
POSTRESPONSE STRATEGIES	1	2	3	4	5	6	7	8	9	10	11
1											
2	10	5	16	19	2	1					
3											
4						2	1				
5						1					
6					1						1
7				1	2		1	3	2		
8		3	3	3	4		3	3	5	2	1
9	2										

The two preresponse guidelines (10 and 11) required that the teacher give a verbal indicative to child if the response was correct or incorrect and that each prompt given must be appropriate for the task step that the child is learning. During session one, Subject A had one error for guideline 10 and eight errors for guideline 11; Subject B had five errors for guideline 10 and two errors for guideline 11. It can be seen that these errors were easy to correct as the number of errors for guidelines 10 and 11 drop off immediately after session one. It should also be noted that Teachers C and D had fewer errors for these guidelines during session one since the guidelines were already in place when they began instruction.

The number of errors for guideline 2 did not significantly decrease during the study as all four teachers committed errors to guideline 2 throughout the study. This guideline referred to probes which were to be used at least once during each training episode.

There were also a large number of errors for postresponse strategy number 2 which suggests that man feedback be given after complete manipulative and complete demonstration from the preresponse phase. Teacher D was the only subject to eliminate this error during treatment although this teacher did have difficulty reducing the errors with strategy 8.

Finally, it should be noted that Tables 8 to 11 display no errors for some of the preresponse guidelines and the postresponse strategies. For example, preresponse guideline 8 and postresponse strategy 6 have very few or no errors during the study.

CHAPTER VI

DISCUSSION

This study examined the systematic use of teacher feedback behaviors as they related to a list of strategies presented to the subjects. Basically the rationale was to have the teacher provide information to the child about his performance of a motor skill. The feedback information not only related directly to the response but also coincided with the preresponse prompt.

The data (see Figures 7 to 10) show that the teachers reduced their preresponse errors during the baseline phase to establish consistent and systematic use of the preresponse prompting continuum. The low frequency of preresponse errors was maintained throughout the treatment and follow-up phases at or below .60 errors per trial. Essentially this means that the teachers were using the prompting continuum to effectively fade both their assistance and information input. Effective fading results in the child reaching an independent performance at each task step within the Task Sequence.

During the baseline, the frequency of feedback behaviors for all the teachers was low. In most cases the data points for frequency of feedback behaviors during baseline was less than .50 per trial. At the end of the treatment phase all the teachers were using at least one feedback behavior per trial. The range on the last two days of treatment was from 1.05 to as high as 2.00 feedback behaviors per trial. More than one feedback behavior would occur when pairing verbal feedback with a physical or visual feedback behavior. The follow-up data show that all but one of the subjects maintained a frequency near to that attained during treatment. Although subject D (Figure 10) did show a drop in frequency of feedback behaviors, she still remained above her baseline performance.

The frequency of feedback errors was generally higher than the frequency of feedback behaviors during baseline. This was as a result of recording errors when feedback should have been provided but was not given after a response. As the frequency of feedback behaviors increased, the frequency of errors decreased during the treatment phase. The difference between these two frequencies grew significantly greater throughout the treatment phase. The trend of a high frequency of feedback behaviors and a low frequency of feedback errors was generally maintained during the follow-up phase.

The data therefore seem to indicate that this desirable trend (a low frequency of preresponse and postresponse errors and a high frequency of feedback behaviors) is attainable through teacher training in a relatively short period of time. It also would seem then, that establishing a relationship between preresponse and postresponse phases of instruction was successful in the present study.

The additional focus on feedback is not a new concept in research of teaching behavior. Close et al. (1978) examined feedback in the context of overcorrection procedures to improve efficiency of skill performance with mentally retarded adults. McLellan and Willis (1979) used specific praise which when combined with prompting proved very successful in increasing verbalizations. These studies and others (Brophy, 1970; Filler, 1976) identified and observed a number of teacher behaviors in order to establish a relationship between teaching behaviors and learning. Filler and Bricker (1976) and Filler (1976) obtained conflicting results in determining whether preresponse or postresponse had a greater influence in learning. These researchers did not consider however, a complete range of possible teaching behaviors that could be used, nor did these studies provide any strategies for preresponse or postresponse teaching behaviors.

Unique Problems

In the present study, the focus on establishing a systematic relationship between preresponse and postresponse behaviors, presented certain questions and problems. First, a primary objective was to develop consistent teaching techniques by training the subjects with the PREP Program materials. The guidelines and strategies were to assist the teacher in knowing what behaviors could be used and why. The problem here was, there was no opportunity to compare the subjects' consistency with any previous criteria. It was not known if the consistency attained was at an acceptable level. This was particularly troublesome in trying to determine what criteria should be established for consistency of preresponse prompting during baseline. This was crucial in order to determine when the teachers were ready to receive the postresponse training. In reviewing the teaching episodes it seemed reasonable to expect the teachers to reduce preresponse errors by at least 50%. It is not known if the general level of consistency attained by these teachers is what should be expected. There is a strong probability that the subjects could become more proficient with more experience and periodic evaluation of their teaching. At this point there does not seem to be enough research data to provide answers or criteria for consistency.

Further research and data may lead to a solution of a second question or problem raised during the study. There may be a dilemma as to what degree structure should exist in teaching interactions and what opportunity should be afforded to the teacher to adjust or modify her behavior strategy during instruction. Possibly the basic question is, "Has the teaching profession and curriculum developers truly attempted to incorporate behavioral principles and procedures during instruction?" Perhaps the teacher training has traditionally focused only on the subject area content and not enough on how the teacher should teach.

Flanders (1970) and Rosenshine (1970) emphasized that the student-teacher interaction is very dynamic and that the most effective teaching behaviors have not yet been clearly identified. The dynamics of this interaction are recognized in teaching severely retarded. The teacher must be able to adjust to the children's variability in skill repertoires, emotional states, perceptual difficulties, communication problems and physical handicaps.

Despite this constant need to adjust and adapt during instruction, Sontag, Burke and York (1973) have affirmed that the identification of competent teaching behaviors is essential for instructing severely handicapped students. It followed then, that the development of the preresponse and postresponse strategies for PREP teachers was important and justified.

While examining the data it must be remembered that there was an attempt to establish a consistent relationship between teacher information before a response and after a response. The investigator believed that this relationship could be predictable and logical. It was expected therefore, and the results seemed to indicate, that while the errors remained relatively low, the frequency of feedback behavior could be increased. This also indicates that generally, the preresponse prompts and guidelines were compatible with the feedback behaviors and strategies. If the feedback behavior increases as the errors decrease, it can be assumed that the teachers can employ the behaviors successfully in a systematic manner.

Variability of Teacher Behavior

It was noted that there was a distinct difference between the first and second set of teachers regarding the preresponse errors on day one of their respective baselines (Figures 7 to 10). The data indicate that initially Teachers A and B (Figures 7 and 8) had much higher frequencies of preresponse errors than Teachers C and D (Figures 9 and 10). Although both sets of teachers reduced the preresponse errors, the drop for Teachers A and B seemed more dramatic. As a result the investigator extended the baseline for Teachers C and D to a fourth day in order to achieve a 50% reduction in errors.

An obvious explanation for the difference would seem to be that the teacher trainer may gain experience and knowledge during the training of different teachers. This knowledge could then assist the trainer in future instruction of teachers and result in the elimination of some of the errors committed by previous teachers.

In fact this does seem to be correct. During the baseline sessions for Teachers A and B the researcher did in fact discover some teaching errors which had not been anticiapted and therefore had not been discussed during training. These not only affected the frequency of errors but caused some coding problems. The serious errors were pointed out to the teachers and further suggestions for correction were given to the subjects. This experience allowed the investigator to anticipate teacher preresponse errors. Thus during the training of Teachers C and D these probable errors were explained and thus avoided when these teachers began baseline instruction.

The variability of individual teachers was generally low, however Figure 7 (Teacher A) reflects some variability during the treatment phase with a drop in feedback behavior during session six. The same teacher had a sharp increase in feedback errors on the first and second days of follow-up (sessions 8 & 9).The most serious consideration should be the increase in feedback errors. Not only did they increase above the baseline level but also increased above the feedback behavior frequency. This returned the teaching pattern to that of the baseline level. It might be reasonable to expect a feedback behavior frequency of 1.00 per trial as acceptably high enough, as long as the frequency of errors is below .50 per trial. If the teacher has as many or even more errors than the frequency of feedback behavior, it is questionable as to what information the child is getting, how the feedback relates to the response or prompt and finally, how meaningful the feedback is to the child.

The investigator was unable to discover any consistent factor from the data which seemed to cause performance variability on certain days. It was noted however that variability did occur on some occasions when a new task step was introduced. This could have caused the teacher to make several adjustments in her strategy causing an increase in feedback errors. On other occasions the child's social behavior (i.e., cooperation with the teacher or attending) may have caused errors in teacher performance to increase.

These factors have to be considered as typical teaching problems which may always cause some variability in the teacher's strategies. It could probably be expected that with more experience the teachers would be able to reduce the variability of their performance.

Probes

The use of probes in the present study was for the purpose of testing the child's skill performance by removing a physical prompt and using only a verbal prompt. Preresponse guideline 2 states that there should be at least one probe during each teaching episode. If the child performed the task step correctly more than once, the teacher moved on to the next task step.

It was observed during the data collection that the use of probes could have been more precisely employed. For example it seemed unfair to ask a teacher to give a verbal probe to a child who was performing at Task Step 1 With Complete Manipulation. In all cases of this circumstance the child only seemed confused at the verbal request. In such circumstances the teachers often avoided using a probe during the teaching episode, resulting in an error being coded.

It was also noted in reviewing the videotapes, that at certain times the teacher should have been more persistent in using the probe. Guideline 3 also stated that if there was no response or two incorrect responses, then the teacher should return to her original prompt. However, once the child began to perform without physical assistance it often appeared that more frequent and persistent use of probes might have allowed for quicker progress. This applied especially when the typical prompt level was visual or verbal.

The Interobserver Agreement

The large number of behaviors which were coded and the number of possible errors (preresponse and postresponse) made the observational instrument a very complex one. Hawkins and Dotson (1973) and Johnson and Bolstad (1973) have discussed how the number of behaviors can adversely affect observer reliability and interobserver agreement. Although these authors suggest that lower criteria for acceptable interobserver agreements ($<80\%$) should be considered, no definite suggestion of alternate criteria seem available.

Agreements were scored based on the scored-intervals method which only measures agreement based on intervals in which at least one observer records a behavior. Therefore low interobserver agreements are more probable with low frequency behaviors. Although unscored-interval agreements could have been calculated, this would not have been as stringent a test for definitions since the high frequency would artificially increase the percent agreement. Since the interobserver agreement was calculated on the errors (preresponse and postresponse) which were previously untested, a stringent test of definition was required. The scored-interval method of interobserver agreement served this purpose.

The low interobserver agreements for guidelines 4 and 7 plus postresponse strategy 4 (Tables 4 and 5) may have been due to a low frequency of these errors. This low frequency could indicate that these guidelines were not necessary or that they were easily learned and implemented without error. Therefore in using interobserver agreement in establising the clarity of a definition one must not only consider percent agreement but also the frequency with which the guideline or strategy was used. Low error frequency for a guideline or strategy may indicate that it is a strong and valuable teaching tool which is easy to use. It may be valuable in the future to establish interobserver agreement on the feedback behaviors themselves in spite of the fact that it would be time consuming.

Since the feedback behaviors had not been tested prior to this study, their functionality and practicality were untested. Feedback strategy 4 (the use of touch feedback) had a low frequency of occurrence and a low percent of interobserver agreement. The question again here is whether or not touch feedback is a useful and practical feedback teaching behavior.

It would seem that further research is needed to establish criteria for evaluating guidelines and strategies for functionality and practicality. If the number of correct implementations of the guidelines and strategies had also been recorded, the data would then have been more informative for evaluating the guidelines and strategies. In this study, since only errors were recorded, it is not known how many opportunities there were to commit the errors.

Also during the training or feedback sessions with the teachers, comments focused on errors committed so that the subject's mistakes could be corrected. This may have resulted in other errors occurring later which were not present earlier in the sessions. When examples of correct use of guidelines were present, this could also have been pointed out so as to avoid errors later. For example, in Table 9 Subject D increased the frequency of errors for postresponse strategy 8 after training began for feedback.

To evaluate the guidelines and strategies, researchers should consider that just because there are no errors the guideline or strategy is unnecessary. The lack of errors may merely indicate that the guideline may be easily trained for use during instruction. For example, preresponse guideline 8 states that there must be at least two levels of prompts used within a category before fading to the next prompt category. Although some teachers had no errors for this guideline, it is important to include in training since such a guideline implies the essence of using the prompting continuum.

Conversely, where a high frequency of error does exist throughout instruction, it may be that the opportunity to use the guideline also increased. For example, large numbers of errors for postresponse strategy 2 (pair Mand Feedback with Complete Manipulation or Complete Demonstration) could have occurred due to a high frequency of opportunity during earlier sessions. Teachers would be commencing instruction at complete manipulation for the teaching episodes and therefore, would have a greater opportunity to commit an error to strategy 2 than when they move on to prompt at a verbal level. In fact, the decline in errors for postresponse strategy 2 may have been due to fewer opportunities after six or eight instructional days to make the errors.

CHAPTER VII

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

In the present study, the researcher attempted to train teachers in the systematic use of the Preresponse Prompting Continuum and the Postresponse Feedback Continuum within the PREP Program. To develop systematic use of the teaching behaviors, a number of preresponse guidelines and postresponse strategies were devised based on previous research (McIsaac, 1980) and observation (Watkinson and Jordan, 1980 see notes). The teachers applied the guidelines and strategies during the instruction of two discrete skills from the PREP Program curriculum.

It was determined that all four subjects were able to gain consistency in the use of preresponse prompts and maintain this consistency during the training for feedback behavior and strategies. Furthermore, the teachers were able to increase their use of feedback behaviors and reduce the amount of error in using these behaviors. Based on this trend, the following conclusions were drawn from the study:

1) It was possible to train teachers to use some preresponse guidelines and thus systematically move through the prompting continuum.
2) Through the presentation and training of specific feedback behaviors, the teachers increased the frequency of providing feedback during instruction.
3) The system of feedback strategies allowed the teachers to provide feedback to the child which related directly to the response and coincided with the preresponse prompting.

There should be some caution, however, in applying and accepting these conclusions. Firstly, it must be remembered that it was not within the scope of this study to measure the frequency of opportunity for each of the guidelines and strategies to be implemented during instruction. Thus, although the teachers errored in some guidelines and strategies but not in others, the researcher cannot conclude that all of these strategies were valid and necessary.

Secondly, the rationale for pairing feedback behavior with prompts in the preresponse phase of instruction was not based on any specific evidence which recommends this as the most effective technique for delivering feedback. Therefore, the researcher does not suggest that the feedback strategies presented are the most effective system of teaching to promote learning. It is suggested, however, that this may be a starting point for testing and evaluating the teacher's use of feedback during instruction.

Thirdly, it must also be noted that the preresponse guidelines and postresponse strategies were only used in teaching two discrete skills. It may be difficult or impractical to implement prompts and feedback in the same manner during instruction of continuous skills.

The results and conclusions serve to indicate that teachers can systematically implement and fade their intervention during instruction. The systematic fading of teacher input both before and after the response is essential if the child is to attain independent performance.

Recommendations

Because of the limited amount of research done on specific teaching behaviors and strategies, studies such as the present one seem to raise more questions than are answered. For this reason, it would seem that there are more recommendations for further research than recommendations for implementing the material developed in the present study.

However, there seems to be enough evidence from the results to warrant the recommendation that the preresponse guidelines and the feedback behaviors and strategies be added to the PREP teacher training materials. It is believed that these materials would assist in developing the teaching competency of the PREP instructors.

In order to assist in the initial training, it might also be recommended that the teachers not only record their prompts but also their feedback behaviors. The teachers should be videotaped and then the teacher trainer should compare what actually happened and what the teacher recorded. It might be expected that there may be some amount of difference between what happened and what is recorded; however, the process will make the teacher much more aware of what she is doing and why.

The other recommendations from this study suggest in effect that more research is required before it can be determined if the teaching materials in this study do in fact increase teacher effectiveness. Therefore, further research is recommended:

1) to further refine the logic and clarity of the guidelines and strategies by recording the opportunity that each may be used during instruction,
2) to establish criteria for evaluating teaching strategies,
3) to evaluate the application of the guidelines and strategies with continous skills as opposed to discrete skills, and

4) to establish criteria for teaching consistency.

It is only through further research, aimed at the above points, that educators will be able to develop some specific strategies and criteria for effective teaching. If the above points are met, then effective teaching can be measured by the student's progress.

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APPENDIX A

RULES FOR CODING

1. Any behavior which does not fit into a category as defined by the definitions is to be ignored. (adapted from McIsaac, 1980).

2. All meaningful pieces of information are to be recorded providing:

   a) that they can be categorized

   b) that they are not excluded by the coding rules

   (adapted from McIsaac, 1980)

3. Each trial is recorded in a horizontal direction from preresponse to postresponse.

4. The task step number and the trial sequence is to be recorded.

5. Coding proceedures:

   Before coding, it is advisable that the observer view the entire teaching episode (adapted from McIsaac, 1980).

   The observer must record the prompting strategy implemented by the instructor; code by level in the "Preresponse" phase. Any prompt used by the teacher which is contrary to the preresponse rules must be marked as a teacher error (↓) and the number of the rule recorded in the "errors" section of the coding sheet.

   The coder must record the child's response in accordance with the teacher's evaluation. However, if the teacher has errored in the evaluation of the response, then an error is indicated at the response check.

Example: Response

C	R	X	N
↓			
✓			

In the example the teacher has indicated to the child that the performance was correct when in fact it was not correct. The coder therefore has recorded the correct response but indicated a teacher error (↓).

A trial is distinguished by:

Situation: Prompt/s - response - feedback and/or reinforcement

Situation: Prompt/s - pause (up to 10 sec.) - no response

There must be a pause of at least three seconds between prompts in order to constitute a new trial.

A teacher error must be recorded if the teacher uses an inappropriate prompt for the task step.

Example: If the child is working at task step four in the target skill Swing on a Bar, but the teacher physically assists the child on to the bar or off the bench to swing, then an inappropriate prompt has been given for that task step. The error is recorded as follows:

M	MP	MG
	↓	
	✗	

The observer must record the feedback behavior implemented by the instructor. This is coded by the level in the "Post-response" phase. Any feedback given to the child which is contrary to the given feedback strategies is checked but a teacher error must be indicated. The number of the specific feedback strategy is recorded in the "Errors" section of the coding sheet.

CODING SYMBOLS

PRERESPONSE	
Physical	
Complete Manipulation	CM
Manipulative Prompt	MP
Minimal Guidance	MG
Visual	
Complete Demonstration	CD
Partial Demonstration	PD
Gesture	G
Verbal	
Skill Cue	SC
Skill Mand	SM
Action Cue	AC
RESPONSE	
Correct	C
Resisted	R
Incorrect	X
No Response	N
POSTRESPONSE (FEEDBACK)	
Physical	
Partial Manipulation Feedback	PM
Touch Feedback	TF
Visual	
Cue Feedback	CF
Mand Feedback	MF
Knowledge of Results	KR
Interruption	/
Teacher Error	↓

DEFINITION OF RESPONSES

Correct Response - those performances that meet the criteria of the task step description given in the Prep Manual.

Incorrect Response - those performances that do not meet all the criteria of the task step description given in the Prep Manual.

No Response - the absence of any attempt at an appropriate performance. An appropriate performance is one which reflects the teacher's mand or request.

Resists - if the child yells, cries, screams, and physically pulls away from the teacher or runs away after a prompt, the behavior is recorded as resists.

Observational Coding Sheet

Teacher: Child:

Dates Episode #: Target Skill:

	PRERESPONSE PROMPTS			RESPONSE	POST RESPONSE FEEDBACK			REINFORCEMENT			ERRORS	
Task Step	PHYSICAL CM MP MG	VISUAL D PD G	VERBAL SC SM AC	C R X N	PHYSICAL MI TF	VISUAL PD G	VERBAL CF MF KR	PHYSICAL	VISUAL	VERBAL	PRE RESPONSE	POST RESPONSE

APPENDIX B

TEACHER TRAINING

Before the teachers gave any instruction to any child in the PREP practicum sessions, they received 3 one-hour lectures. The purpose of these lectures was to introduce and explain the implementation of PREP curriculum materials as well as teaching techniques. The following schedule outlines the training schedule which led up to baseline teaching:

TEACHER TRAINING SCHEDULE

Day One 1½ hours (Lecture)

- overview of Assessment and the matrix of prompt levels with task sequences
- the Individual Instruction process including teacher prompting continuum

Day Two 1 hour (Lecture)

- teaching techniques (fading, delaying)
- monitoring student progress

Day Three 1 hour (Lecture)

- review in detail one skill sequence (preparation for practice teaching)
- view videotapes of teaching episodes
- assign children for practice teaching (not children to be used in the study)

Day Four Practice Teaching (no data collected)

Day Five 1 hour (Lecture)

- review in detail task sequences - Jump Down
  - Swing on a Bar

Day Six Practice Teaching

Day Seven 1 hour (Lecture)

- preresponse rules for fading

Day Eight 1 hour (Lecture)

- review preresponse rules

Day Nine

- begin teaching for data collection (baseline)

All training material was taken from the PREP Manual (Watkinson and Wall, 1979). At the end of the daily teaching sessions the videotapes were coded and the reliability checked by a second observer. Before the next teaching session each teacher viewed the videotapes and was given feedback. This feedback during baseline concentrated on the implementation of the prompting continuum and the task sequence. The first set of teachers had a three day baseline and the second set had 4 days of baseline. During this time data was kept on the preresponse errors and postresponse errors. Once the data indicated the 50% reduction of preresponse errors then training began for use of the feedback behaviors and strategies.

Preresponse Guidelines

1. An appropriate verbal prompt should accompany any physical or visual prompt. For example, if the teacher is touching the child's knees, the appropriate verbal prompt in Jumping Down might be, "Bend your knees."
2. A probe should be used once during each teaching episode. The probe should be from two categories ahead. For example, if instruction is typically at the physical category, the probe should be at the verbal category (skill mand). If the child responds correctly, continue at the verbal level to establish whether or not it is a typical performance.
3. When there are two consecutive incorrect responses or no responses, return to the previous prompt level. For example, if the child responds incorrectly twice in a row with a Manipulative Prompt then return to a Complete Manipulation Prompt for one or two trials.
4. Obtain at least two-out-of-three correct responses before fading to the next prompt level. (This can be carried from the previous episode). For example, the child would have to respond correctly two-out-of-three trials at a Demonstration level before the teacher uses a Partial Demonstration.
5. Three consecutive correct responses should be obtained at Minimal Guidance before giving only a Demonstration.
6. If a Skill Cue has been used as a prompt, a new or different Skill Cue should not be introduced unless the original error has been corrected. For example, the teacher should not tell the child to bend his knees, and then to land on two feet, if he has not correctly performed bending his knees.

7. The teaching episode should start at the most typical response (prompt) from the previous episode. For example, if the child was last performing consistently with Minimal Guidance, and is ready to move to Demonstration, use Minimal Guidance for the first trial in the next teaching episode.
8. There must be at least two levels of prompts used within a category before fading to the next category. (The level of least assistance within each category seems likely before fading but may not be necessary.)
9. Independent performances at a skill mand for each task step must be attained before prompting ahead to the next task step.
10. A verbal indication must be given to the child as to whether or not the child's performance was correct or incorrect. This evaluation must conform with the task step criteria.
11. Each prompt given must be appropriate for that task step and not from a task step previously taught or which has not been taught yet.

Postresponse Strategies

1. Appropriate verbal feedback is paired with physical or visual feedback.
2. Mand Feedback is paired with Complete Manipulation and Complete Demonstration of a skill.
3. When a Manipulative Prompt is given, which is specific in nature to a certain body part or parts (i.e., head, hands, knees, etc.) then a Partial Manipulative Feedback should be given after the response using the same body part or parts in the same manner.
4. Touch Feedback is paired with Minimal Guidance which specifically prompted a certain body part. Therefore the teacher may touch a child's hands to prompt for holding on to the bar. After the response the teacher would again touch the child's hands and say, "Good, you held tight with your hands."
5. A Partial Demonstration prompt which focuses on the movement of a specific body part or parts (i.e., foot, feet, knees, hands, seat, etc.) then the specific Partial Demonstration is repeated in postresponse with the appropriate verbal information. If, however, a Partial Demonstration is given to indicate what target skill is to be performed, then the Mand Feedback should be used.
6. A Gesture Prompt which is used to indicate the movement of a specific body part or what piece of equipment is to be used, should be used also as Gesture Feedback.
7. When a specific Skill Cue is given then the teacher gives a Cue Feedback of the same nature, but does not give a specific cue or performance (i.e., Good, you bent your knees) if the cue was not given in the preresponse.

8. When the child performs a Skill Mand at any task step, the teacher should give Mand Feedback.
9. After two correct responses, the teacher should fade to Action Cue Prompt and Knowledge of Results Feedback.

JUMPING DOWN

EQUIPMENT

Boxes and benches
of various heights.

TASK SEQUENCE	PHYSICAL PROMPTS	OTHER TEACHING SUGGESTIONS
1. Step down from shin height one foot to the other.	CM. Face child, hold both hands and pull so that child steps off bench. MP. Pull, releasing after take-off.	Step down from bench into hoop target on floor, jump board, etc. Stand behind child holding under shoulders or holding hands around front of child. Give gentle push at shoulders or short pull from hands. Step down with child, holding his hand and reducing prompt. Gradually increase height from which child steps down. Use a small set of stairs for child to step down.
2. Jump down from shin height with a two-foot take-off and landing.	CM. Face child and hold both hands. Pull downward on hands so that knees bend, then pull up and lift child off bench to floor. Be sure child is momentarily suspended.	Jump onto a crash pad, into sand, snow, or foam rubber. Move target further away from take-off spot.

TASK SEQUENCE	PHYSICAL PROMPTS	OTHER TEACHING SUGGESTIONS
	MP. Manipulate child into slight crouch, then hold hands out in front so that child reaches for them as he jumps. Reduce contact time until child touches hands only on landing. Finally, hold out hands but do not allow contact throughout jump.	Fade prompts by releasing child's hands in air, decreasing contact time in successive trials. Encourage child to land low, with knees bent.
3. Jump down from knee height with two-foot take-off and landing.	MP. Hold hands out in front so that child reaches for them as he jumps. Reduce contact time until child touches hands only on landing.	Gradually increase height of jump. Say "Jump to me" and stand back 4' - 5'. Jump onto crash pad. Do a jump, land and roll (or fall) on a crash pad.
4. Jump down from hip height with a two-foot take-off and landing.	MP. Hold one hand and reduce prompt by releasing child's hands in air, decreasing contact time in successive trials.	

SWINGING ON A BAR

EQUIPMENT

Horizontal bar 8-12" higher than child's head.

TASK SEQUENCE	PHYSICAL PROMPTS		OTHER TEACHING SUGGESTIONS
1. Hang from horizontal bar with two hands for five seconds.	CM.	The teacher lifts child up form behind by holding under shoulders. Teacher places the child's hands on the bar and holds them there while he hangs.	Have one teacher hold child's hands on bar while another lifts feet off bench. Change diameter of bar so that child can overlap thumb and finger.
	MP.	Lift child and let him grab bar. Hold child under shoulders.	Vary height of bar according to size of child. Child should be able to stand up straight while holding bar from bench.
2. Stand on bench and hold onto bar with two hands. Step off bench and hang under bar for five seconds.	CM.	Stand child on bench and place child's hands on bar. Lift feet off the bench and allow child to hang, giving some support at hips.	
	MP.	Stand child on bench and let him grab bar. Push child's feet off bench and allow to hang for five seconds.	

TASK SEQUENCE		PHYSICAL PROMPTS	OTHER TEACHING SUGGESTIONS
3. Stand on bench and hold onto bar with two hands. Step off bench and swing back and forth at least twice.	CM.	Child stands on bench holding bar. Stand beside child and as he steps off bench, swing his legs forward by holding him under thighs.	
	MP.	Child stands on bench holding bar. Give gentle push on lower back to prompt swinging action.	
4. Stand on bench and hold onto bar with two hands. Step off bench and swing back and forth at least twice. Return with feet unto bench and repeat.	CM.	Child stands on bench holding bar. Allow him to step off and swing forwards and backwards. On the backward swing, push on child's shins and place feet back on bench behind child.	
	MP.	Child steps off bench, swings forwards and backwards. On the backward swing, push lightly on child's feet and steer them towards bench. Child then steps back onto bench.	

APPENDIX C

Observational Summary Table

Subject A

Day	Average no. of trials/episode	Average no. of teacher errors/trial	Average no. of teacher errors/trial (Preresponse)	Average no. of teacher errors/trial (Postresponse)	Average reinforcement per trial
One	5.25	1.90	.95	.95	.95
Two	3.50	1.14	.29	.86	.93
Three	4.0	1.44	.44	1.00	1.06
Four	5.5	1.04	.32	.73	1.09
Five	3.5	1.00	.29	.62	1.29
Six	4.0	.75	.31	.44	1.08
Seven	3.5	.76	.57	.19	.80
Eight	4.0	1.00	.25	.75	1.62
Nine	3.5	1.86	.57	1.29	.42
Ten	4.0	1.00	.50	.50	.85

Observational Summary Table

Subject D

Day	Average no. of trials/episode	Average no. of teacher errors/trial	Average no. of teacher errors/trial (Preresponse)	Average no. of teacher errors/trial (Postresponse)	Average reinforcement per trial
One	4.25	1.29	.59	.71	1.00
Two	4.34	1.00	.38	.61	.82
Three	7.75	.81	.19	.61	1.00
Four	7.00	1.11	.29	.82	1.07
Five	5.75	.56	.19	.39	1.17
Six	5.25	.48	.29	.19	.57
Seven	6.00	.25	.04	.21	.92
Eight	6.50	.46	.23	.23	.42
Nine	6.67	.45	.10	.34	.55
Ten	6.00	.21	.12	.08	1.12
Eleven	7.00	.29	.21	.07	.71

Observational Summary Table

Subject B

Day	Average no. of trials/episode	Average no. of teacher errors/trial	Average no. of teacher errors/trial (Preresponse)	Average no. of teacher errors/trial (Postresponse)	Average reinforcement per trial
One	5.25	2.48	1.09	1.33	.80
Two	3.75	1.34	.40	.93	1.06
Three	3.50	1.57	.36	1.21	1.50
Four	6.25	1.28	.56	.72	1.00
Five	5	.65	.25	.40	1.15
Six	4	1.06	.44	.75	1.06
Seven	3.75	1.13	.53	.60	1.00
Eight	3.75	.60	.34	.26	1.27
Nine	4.50	1.00	.67	.33	1.10
Ten	ABSENT				

Observational Summary Table

Subject C

Day	Average no. of trials/episode	Average no. of teacher errors/trial	Average no. of teacher errors/trial (Preresponse)	Average no. of teacher errors/trial (Postresponse)	Average reinforcement per trial
One	4.5	1.28	.33	.94	1.60
Two	4.75	1.00	.63	.36	1.00
Three	6.50	.88	.25	.61	1.46
Four	5.25	.70	.33	.43	1.33
Five	4.67	.71	.21	.37	.94
Six	5.00	1.05	.40	.65	1.15
Seven	6.75	.30	.30	.00	.59
Eight	5.25	.57	.24	.33	1.24
Nine	5.25	.57	.19	.38	1.09
Ten	4.75	.63	.26	.37	1.83
Eleven	4.50	.94	.33	.61	1.11